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Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON Vol. 44 No. 4 | July/August 2020

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[FROM THE EDITOR

Coronavirus Contemplations

Over the course of human history, pandemics have repeatedly knocked civilization back on its heels. Many thought they were ancient history. Now we find ourselves amid a pandemic in our own time. Life everywhere has changed. After months of restrictions, countries and states have eased their stay-at-home orders, and we head into a more open but still dangerous and uncertain period. Will we see a gradual return to normalcy or phase two of the coronavirus pandemic?

While we deal with that, I find myself contemplating the long-term effects of the pandemic. I wonder: Will our newfound reliance on experts in biomedicine and public health usher in a new era of respect for science, in the way the end of World War II and then Sputnik initiated a new era of respect for physicists and engineers? Will virologists and infectious disease experts join health care workers as our new heroes? Will the welcome refrain, "We will be guided by the science" gain more than a temporary foothold in culture? There are hopeful signs. But there have been equal signs that we may revert back into the same old patterns of self-interest, tribalism, and partisanship that have divided us for far too long. We'll watch all that with great interest.

One national columnist opined at length on how science isn't the end-all be-all and how science can't make policy. That's true, but science can—and should—*guide* policy. What he failed to point out is the danger of pseudoscience and misinformation guiding policy. That *is* a real peril.

At any rate, the pandemic has brought plenty of the same old hucksterism and misleading, if not outright false, claims that scientists and skeptics confront daily. We devote considerable space in this issue to examining all this. In an extensive Special Report, SI Deputy Editor Ben Radford tells us how to get literate about pandemic information. This includes overreactions and underreactions, idiots and maniacs, Cassandras and Chicken Littles, dueling projections and predictions, uncertainties in models and testing, incomplete testing, certainties and unknowns, and social media hygiene. All essential lessons. Three of SI's regular columnists also tackle pandemic issues. Massimo Polidoro demands, "Stop the Epidemic of Lies!" and addresses several notable conspiracy theories and hoaxes that have spread much like the virus itself. Stuart Vyse examines the question of whether superstitions caused the COVID-19 outbreak. "SkepDoc" Harriet Hall laments all the false immunity-boosting claims alternative medicine has offered and ends with information on how you can *really* boost your immune system.

* * *

Our interview with Ann Druyan (by Rob Palmer) in this issue took place during the coronavirus shutdown. She laments the "massive contempt for science" that led to our country's dire results. But, like her 2020 *Cosmos: Possible Worlds* TV series, re-airing worldwide this fall on Fox, her basic message is optimistic. "I wanted to create something that had a vision of a hopeful, but not an unrealistic impossible, future." Humanity seems more clever than wise, but it can learn. It can be inspired. For her, "Science and skepticism were the means to have the greatest spiritual experiences of my life." All involve "the romance of being alive in the cosmos and the beauty of nature. … The dream of *Cosmos* is that science is a birthright that belongs to every single person. …"

—Kendrick Frazier

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New Campaign Fights Accusations of Witchcraft in Africa amid COVID-19

Leo Igwe

A new campaign launched in January in response to pervasive cases of witch persecution and related abuses in Africa is now facing additional challenges as the world grapples with the coronavirus pandemic. COVID-19 could trigger even more witchcraft allegations in African communities, but it presents educational opportunities as well.

Advocacy for Alleged Witches (AFAW) was launched to supply the missing link of activism in the campaign for the eradication of witch-hunting in Africa. However, the mission faces many challenges.

First, African witchcraft has largely been misrepresented in the West and throughout the world, often by institutions. Many Western nongovernmental organizations (NGOs) have cashed in on the misconceptions and use exoticizing and patronizing campaign approaches that perpetuate—instead of help resolve—the problem.

Witchcraft has often been presented as a socially stabilizing mechanism that helps African societies to function. This mistaken anthropological position, which is dominant in "scientific" and popular Western literature, has hurt the advocacy for alleged witches in Africa. This misrepresentation has led to a lackluster campaign by United Nations agencies and Western NGOs that fund campaigns to eradicate child and adult witch accusations in the region. This largely unproductive and ineffective approach must change.

For some reason, witchcraft beliefs in Africa have been treated like a domesticated useful facility, not a wild and destructive phenomenon that wreaks havoc in the lives of people across the region. The campaign against witch persecution in Africa has been dominated by agencies, organizations, and activists that have refused to call witchcraft belief by its name: myth or superstition. In some cases, organizations have Christian re-missionization agendas and are more interested in using witch persecution in Africa as a medium for evangelization than in ending this vicious phenomenon. In other cases, there are organizations that have, in trying to avoid being labeled racist or neocolonialist, resolved not to designate witch persecution as an irrational, superstitious practice that Africans should abandon.

SAY NO TO THE MEETING OF
WITCHES AND WIZARDS!!!
POLUTE OUR ENVIRONMENT PLEASE.
UNIVERSITY OF NIGERIA BELONGS TO JESUS,
SO WITCHES AND WIZARD,
NO WAY!!! NO VACANCY!!!
WE PLEAD THE BLOOD OF JESUS
OVER THE UNIVERSITY OF NIGERIA,
HENCE, WE REJECT ALL FORMS OF
WITCHCRAFT OVERTLY OR
COVERTLY IN JESUS NAME, AMEN
Anti-witch posters displayed in Africa.

However, COVID-19 has provided a great lesson. As with the coronavirus pandemic, a campaign against witch persecution must be based on fact and science, not on fiction and superstition. Evidence-based propositions should be the guiding principles. So in situations where religious beliefs or practices pose a threat or undermine the advocacy against witch persecution, such practices must be called out and be critically examined—whether they be traditional, Christian, Islamic, or Bahai.

Some activists and organizations do not want to openly and publicly take on the negative role religion plays in witch persecution in Africa because they do not want to be perceived as atheists or nonbelievers. They do not want to make statements that imply skepticism, such as stating that witches do not exist in the way most people believe. They fear such statements will alienate Africans and their Christian partners in the campaign.

Regarding COVID-19, the World Health Organization has issued guidelines based not on what aligns with specific cultures and religions but what will help contain the virus. What actually alienates people is being dishonest or ambiguous about one's position on the existence and nonexistence of witches (and by implication other magical entities). Stating clearly that witchcraft belief is superstition is the most effective way to end witch persecution.

Stating clearly that witchcraft belief is superstition is the most effective way to end witch persecution.

The COVID-19 pandemic presents an opportunity for AFAW to help prevent allegations of witchcraft. Witchcraft allegations are often a way for people to make sense of uncertainties and anxieties over terminal and incurable diseases. Thus, the pandemic presents an opportunity to correct misinformation about the cause and spread of the coronavirus—especially attributions of the pandemic to occult, magical, or witchcraft forces.

Advocacy for Alleged Witches is not an antireligious initiative, nor is it

a campaign to abolish religion or get people not to believe in God. There are religious persons who are contacts of AFAW in some countries. Wherever religion is part of the problem, it will be noted and addressed. And wherever it is a resource, it will be tapped to help realize an Africa free of witch-hunting. AFAW seeks to work and partner with religious individuals and faith-based organizations that are committed to eradicating this dark and destructive phenomenon. AFAW exists to provide a robust response to witch persecution in Africa and to help build a critical mass of African advocates for alleged child and adult witches by 2030.

In the short time since its inception, AFAW advocates have visited many media agencies in Nigeria, with many face-to-face meetings with journalists and reporters. The media establishment constitutes a critical platform for the education and enlightenment of the public. AFAW advocates have also visited child orphanage homes and shelters for victims of child witchcraft allegations in Akwa Ibom and Cross River states. The resources at these centers are overstretched, and without sustained support they may need to start rejecting child witch victims.

AFAW also has a campus program set up to rally students against witch persecution and killing. Working with these kinds of groups, police, and others, AFAW hopes to establish a critical mass of advocates in all African countries who work against witch persecution and other superstition-based abuses across Africa.

More information on AFAW can be found at https://advocacyforalleged-witches.law.blog.

Leo Igwe is a Nigerian human rights advocate and founder of AFAW who has a doctorate in religious studies. He is also founder of the Nigerian Humanist Movement. He wrote the Commentary "Witch Hunting Requires an International Response" in our November/December 2019 issue.

Missouri Sues Televangelist Bakker for Selling Fake Coronavirus Cure

Joe Nickell

Following my article on "Magic Waters," part of the Skeptical Inquirer's special issue on "The Health Wars" (September/October 2019), another type of supposedly magical water has made the news. Televangelist Jim Bakker advertised on his website ("The Jim Bakker Show," February 12) a product called Silver Solution. Its label says it contains "deionized water." That is essentially *demineralized* water (water that has been treated to remove nearly all of its mineral ions). A combination of processes (such as carbon filtering, ultraviolet oxidation, electrodeionization, and others) is sometimes employed to produce ultrapure water (having only trace contaminants, measured in parts per billion). Highly purified water has many uses—notably in medications (though also in beverages to help maintain product consistency).

The demineralized water was being touted as something of a high-tech snake oil.

In Silver Solution, however, the demineralized water was being touted as something of a high-tech snake oil. It appears it also contains colloidal silver (as its name implies), which is found in similar products. However, according to the National Center for Complementary and Integrative Health, the silver not only provides no known health benefits but may also cause side effects, such as skin discoloration and the body's poor absorption of other medicines.

In an online article, Hunter Moyler of *Newsweek* (February 12) reported that a naturopath on Bakker's show claimed Silver Solution had proven effective not only in boosting a person's immune system but also in attacking viruses related to the novel coronavirus (COVID-19). While admitting the putative medicine had not been tested on that particular strain of the virus, naturopathic doctor Sherrill Sellman claimed it had been able to "eliminate" other strains of the coronavirus "within twelve hours"—a claim *Newsweek* was unable to verify. Neither was *Newsweek* able to confirm that colloidal silver was included in Bakker's solution or that Sellman was even suitably accredited.

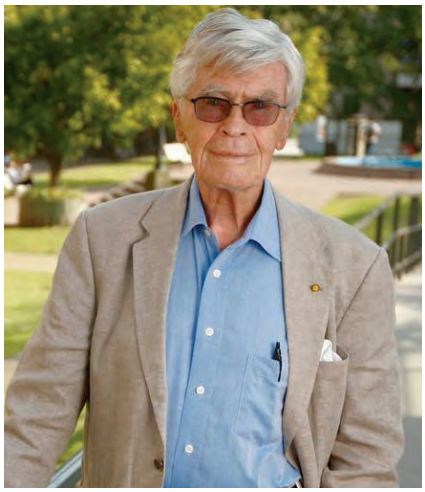
Colloidal silver not only provides no known health benefits but may also cause side effects, such as skin discoloration.

Following the *Newsweek* report, the state of Missouri sued Bakker and his Morningside Church Productions, demanding they stop advertising or selling either the Silver Solution or any related products for treating the coronavirus (Matthew S. Schwartz, npr.org, March 11). The sale of any bogus treatment for the COVID-19 disease would constitute a violation of both state and federal law.

Joe Nickell, PhD, is CSI's senior research fellow. He often investigates claimed cures that run counter to science-based medicine.

Mario Bunge: Physicist, Philosopher, Champion of Science, Citizen of the World (1919–2020)

Michael R. Matthews



Mario Bunge, the centenarian Argentine/Canadian physicist/philosopher, passed away in the loving company of his wife and two children on February 24, 2020, in Montreal. He turned 100 on September 21, 2019.

Bunge was one of the outstanding figures in twentieth-century philosophy of science; few others approached the scope, depth, and detail of his contributions to the discipline. Bunge was a cosmopolitan scholar at ease listening, speaking, reading, and writing in English, Spanish, French, and German—and only slightly less at ease in several other languages.

He was a longtime fellow of the Committee for Skeptical Inquiry and a frequent contributor to the Skeptical Inquirer, including just last year (see box on p. 8).

When Bunge was sixty-five, Bernulf Kanitscheider, a German philosopher of science, wrote:

> Few extraordinary personalities have the chance to decisively shape the intellectual geography of a scientific epoch. Mario Augusto Bunge belongs to the small circle of important philosophers of science whose works have already become landmarks in the spiritual landscape of world philosophy.

Subsequently, Bunge published a further twenty books and over 200 articles. That none of his works have become classics in Anglo-American philosophy is an enduring puzzle. Many less-substantial works by less-careful and less-informed scholars have become landmarks.

Bunge's uncommon distinction was that he did both science and philosophy in tandem. He researched and published in physics while formulating an integrated "scientific" philosophical system. Of the latter, he says:

> Scientific philosophy is essentially critical and self-correcting, requiring that its assertions be put to the test. Philosophy … deserves to be called 'scientific' solely to the extent to which its hypotheses are somehow testable—whether directly (by their logical compatibility with a given set of principles) or indirectly by the verifiable consequences such ideas may have on practical human activity and on scientific research. (Bunge [1959] 1979, p. xxviii)

Bunge was a prolific and serious researcher across a staggering range of fields. In seventy books (including many translations and revised editions) and 540 articles written over eighty years, he made substantial contributions to physics, philosophy of physics, metaphysics, methodology and philosophy of science, philosophy of mathematics, philosophy of psychology, philosophy of social science, philosophy of biology, philosophy of technology, moral philosophy, social and political philosophy, medical philosophy, criminology, legal philosophy, and education. At age ninety-eight, he published on the philosophical—specifically ontological—implications of the discovery of the gravitational waves that were predicted in Einstein's 1916 theory of general relativity.

Twenty years ago, Martin Mahner, a German philosopher/biologist who worked with Bunge at the McGill Foundations and Philosophy of Science Unit, published a collection of thirty of Bunge's philosophy papers ranging over nine different fields. Many of Bunge's papers are now available on the internet.

In terms of breadth, depth, and coherence of scholarship, Bunge was a standout in twentieth-century scientific and philosophical communities. He was a Renaissance scholar, a citizen of the world, and a convinced universalist who thought that not only were there truths in science but also truths in ethics and politics that could be identified and defended. He vigorously argued for the legitimacy and utility of the concept of pseudoscience. It was not just a rhetorical slogan; it was central to his lifelong critique of Freudianism and psychoanalysis and later critiques of parapsychology, rational-choice theory, and alternative medicines.

For many, Bunge's realist interpretation of quantum mechanics was his major contribution to modern physics. In 2003, he surveyed the arguments in his "Twenty-Five Centuries of Quantum Physics: From Pythagoras to Us, and from Subjectivism to Realism." In a journal double-issue, ten physicists and philosophers laid out and appraised his "signature" account of quantum mechanics, with Bunge replying.

Early in his career, Bunge held chairs in physics and philosophy at the University of Buenos Aires and Universidad Nacional de La Plata. His appointments and funding rose and fell with changes in Peronist and military governments. Bunge made his international philosophical debut at thirty-seven at the 1956 Inter-American Philosophical Congress in Santiago, Chile. Willard Van Orman Quine, in his autobiography, mentions attending this congress, and the only thing about the congress that he thought worth recording was:

> The star of the philosophical congress was Mario Bunge, an energetic and articulate young Argentinian of broad background and broad, if headstrong, intellectual concerns. He seemed to feel that the burden of bringing South America up to a northern scientific and intellectual level rested on his shoulders. He intervened eloquently in the discussion of almost every paper. (Quine 1985)

Physicists have acknowledged the impact of Bunge's work. In 1989, the *American Journal of Physics* asked its thousands of readers to vote for their favorite papers from the journal, from its founding in 1933 to 1989. In the resulting 1991 list of most memorable papers, alongside classics from Nobel Prize winners and luminaries such as Bridgman, Compton, Dyson, Fermi, Kuhn, Schwinger, Wheeler, and Wigner, was Bunge's 1956 "Survey of the Interpretations of Quantum Mechanics." In 1993, the journal repeated the exercise, asking readers for the most influential papers in the journal's first sixty years. In this list, Bunge's 1966 paper "Mach's Critique of Newtonian Mechanics" took its place alongside his 1956 article. This recognition of a philosopher/physicist by the world's largest body of physics teachers and researchers is noteworthy. Bunge is one of only two philosophers listed in the American Association for the Advancement of Science (AAAS) Hall of Fame. The other is Bunge's boyhood hero, Bertrand Russell.

Philosopher (and CSI Fellow) Susan Haack lamented of contemporary philosophy that: "Our discipline … becomes every day more specialized, more fragmented into cliques, niches, cartels, and fiefdoms, and more determinedly forgetful of its own history" (Haack 2017). Through his long life, Bunge stood against every narrowing and narrow-minded tendency that Haack lamented.

Bunge was a systematist for whom the natural and social worlds were causally interconnected, and so knowledge of those worlds needed to be interconnected; there could be no isolated or orphan disciplines, no academic silos. His philosophical system is laid out in detail in his monumental eight-volume *Treatise on Basic Philosophy* (1974–1989). In the October 2012 *Science & Education* journal special issue, a group of economists, sociologists, mathematicians, philosophers, and cognitive scientists evaluated his systematicity as applied to their own disciplines.

Bunge believed that the lessons learned from the hard-won successes of natural science should be applied to social science and that the inquiry template forged by the best of natural science can and should be applied to the social and psychological worlds. This is the eighteenth-century Enlightenment position.

In matters of academic debate, Bunge believed that arguments should be stated as clearly and exactly as possible and stated whenever warranted. Lights should not be kept under bushels, and spades should be called spades. He had no regard for "soft-focus" writing or argument. Instead of saying, "It could be thought that there is a weakness in your argument," he preferred the more direct "Your argument is weak." Instead of warm, pleasant, and collegial agreement about claims that cannot be tested, he sought clear, specific hypotheses that can be tested against evidence. His exchanges with Bohm, Heisenberg, Piaget, Popper, Kuhn, Quine, Gould, Lakatos, von Weiszäcker, and so many others exemplify that conviction. As for many lesser but popular figures (such as Heidegger, Husserl, Garfinkel, Latour, Huntington, Bloor, and Feyerabend) after appraising their work he dismissed them as "charlatans."

Bunge's passing is a loss for his family and the scholarly world. Hopefully some in the succeeding generations of philosophers, physicists, and educators will be inspired to emulate his example of a wide-ranging, in-depth, cosmopolitan approach to the advancement of knowledge and the formation of a more just and equitable society. These Enlightenment ideals are also those of liberal education.

A Mario Bunge Skeptic Reader

Skeptical Inquirer articles by Mario Bunge:

"The Dematerialization Crusade," March/April 2019

"The Philosophy Behind Pseudoscience," July/August 2006

"Absolute Skepticism Equals Dogmatism," July/August 2000

"What Is Pseudoscience?" Fall 1984

Skeptical Inquirer articles about Mario Bunge:

"Science, Philosophy, and a Lifetime of Reason: A Mario Bunge Centenary Festschrift," Kendrick Frazier, January/February 2020

"The Scientist and the Philosopher" (a review of Bunge's memoir *Between Two Worlds*), James Alcock, March/April 2017

"Philosophy Meets Medicine" (a review of Bunge's *Medical Philosophy*), Harriet Hall, January/February 2014

"Explanatory Frameworks …" Editor's Note, July/August 2006

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Quine, W.V.O. 1985. *The Time of My Life: An Autobiography*. Cambridge MA: Bradford Books.

Michael R. Matthews is in the School of Education, University of New South Wales, Australia. He is editor of *Mario Bunge: A Centenary Festschrift* (Springer International Publishing, 2019).

Pentagon Releases Old 'UFO' Videos, with Expected Results

Benjamin Radford

In April 2020, the Pentagon declassified and released three U.S. Navy videos that show "unexplained aerial phenomena" that fighter pilots saw during training flights in 2004 and 2015.

Despite sensational headlines, the videos were neither new nor particularly mysterious. They had been leaked (and even reported on, for example in *The New York Times*) in 2007 and 2017 (see SI, March/April 2018; May/June 2018) and much ballyhooed by UFO groups. The videos were released, according to a Navy spokesperson, "to clear up any misconceptions by the public on whether or not the footage that has been circulating was real or whether or not there is more to the videos."

Of course, in the conspiracy-laced world of UFOs, it cleared little up. Few people doubted that the videos themselves were authentic; they seemed like clips of ordinary footage routinely taken by military pilots. They *could* have been clever fakes, but there would seem little point in hoaxing them, because the videos themselves were far from obviously extraordinary. Furthermore, releasing the videos would not demonstrate "whether or not there is more to the videos" because they could easily be edited prior to release.

In any event, it was not the videos themselves but the dramatic claims made about what they depicted that made them fodder for UFO buffs. It's important to note that the Navy never *claimed* the clips were unusual or mysterious; nor did it suggest that they defied explanation or later analysis. They were just clips of things that pilots hadn't been able to identify at the time, which were later released when it was determined that they contained no sensitive information (and were already public anyway).

In the conspiracy-laced world of UFOs, the release of the videos cleared little up.

Some claimed the fact that the objects appeared both visually and on instrumentation somehow lent legitimacy to the claims or was evidence of the objects' otherworldly origin. Yet it does nothing of the sort. It does rule out psychological explanations (such as a hallucination or optical illusion) and instrumentation errors (such as sensor malfunction or a display error). It tells us that the objects—whatever they were—were actual, legitimate UFOs (literally, "unidentified flying objects"). But of course just because someone, even an experienced pilot, can't identify something doesn't mean it's unusual or alien—just that from that angle and going at that speed under those lighting and environmental conditions at that far distance, they couldn't be sure what it was. Pilots have experience in the skies, but that doesn't automatically mean they always correctly identify aircraft, balloons, satellites, and even bright stars under all conditions.

Pilots have experience in the skies, but that doesn't automatically mean they always correctly identify everything in them.

So what's on the videos? Well, like with most mysterious videos (of Bigfoot, ghosts, lake monsters, or anything else), if it were clear what the objects were, then they wouldn't be mysterious. It's difficult to be sure what, exactly, the pilots saw (years later at unknown times and locations), but fortunately there is a wealth of information contained in the videos themselves. Science writer Mick West collaborated with others to offer exhaustive analyses on his Metabunk website, and his overview titled "Explained: New Navy UFO Videos" can be found on YouTube. Two of the UFOs are likely distant planes, and the third is likely a balloon. They appear to be moving at high rates of speed—and in one case even pivoting on its axis in midair, an impossible aerial maneuver—though these are artifacts of the videos. An allegedly mysterious "aura" seen on thermal camera footage around the object, for example, is merely image sharpening. With so little evidence of alien visitation even after decades of assurances that any time now the global UFO cover-up will be broken, the UFO community remains reduced to mystery-mongering perfectly explainable videos.

For additional perspective, see Skeptical Inquirer's special issue on the new UFO interest, fact and fiction (January/February 2009). It leads off with Robert Sheaffer's retrospective on the fads and foibles of six decades of UFOlogy.

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Coronavirus Crisis: Chaos, Counting, and Confronting Our Biases

Evidence-based analysis from scientific skepticism on how to live wisely with the COVID-19 pandemic and how to avoid another contagion: social media misinformation.

Benjamin Radford

Credit: Celestia Ward

The numbers were grim, changed constantly, and told only part of the story. As of early June there were nearly 6 million diagnosed cases of COVID-19 worldwide, with over 350,000 deaths and 2.3 million recovered. Of those, over 1.6 million patients and nearly 100,000 deaths were in the United States. With only a small percentage of Americans tested, it was likely that the true number infected was far higher. Dozens of states were taking the first steps toward easing stay-at-home orders, at times spurred by "reopen" protests. Many nonessential businesses remained closed, and most Americans hadn't sat down at a restaurant or gone to a movie theater in months. Conspiracy theories swirled, unemployment skyrocketed, economies sunk, and there were scattered reports of panic, shortages, and hoarding.

Getting Literate about Information

During times like this, there's a natural—almost Pavlovian—tendency to follow the news closely. News and social media were awash with information about the COVID-19 pandemic that had been spreading throughout the world since January. But much of what's shared on social media about the coronavirus has been false, misleading, or speculative. It's easy to become overwhelmed, and science-informed laypersons likely suffered this overload keenly, as we absorbed the firehose of information from a wide variety of sources: from the White House to the CDC, conspiracy cranks to Goop contributors.

It was a never-ending flood of information, and those charged with trying to sort it out were quickly inundated. We had a Goldilocks situation: too little, too much, and just the right amount of information about the COVID-19 virus in the news and social media.

There's information that's true, including the most important, practical information—how to avoid coronavirus: wash your hands, avoid crowds, don't touch your face, sanitize surfaces, and so on. This type of information has been proven accurate and consistent since the outbreak began. This is of course the smallest category of information: *mundane but vital.*

Then there was *information that's false*, including a wide variety of rumors, miracle cures, misinformation, and so on. In March, the Center for Inquiry (CFI) set up an online Coronavirus Resource Center to help journalists and the public debunk false information and provide accurate resources. Drawing upon unique expertise from CFI's Committee for Skeptical Inquiry, the site was at attempt to inoculate against misinformation. It provided original analytical articles, links examining the latest false medical claims and misinformation (one in April noted that Google saw more than 18 million daily malware and phishing emails related to COVID-19 in just one week), and links to other general resources and knowledge centers, such as the CDC, FDA, and Johns Hopkins. (This report is an

updated and revised blend of three original analyses written for and posted on that site. For more, see centerforinquiry.org/coronavirus.)

There was also a deluge of speculation, opinion, and conjecture. Dueling projections about the outbreak varied by orders of magnitude as experts and social media pundits alike shared their speculation. Of course, epidemiological models are only as good as the data that goes into them, and they are based on many premises, variables, and numerous unknowns.

In March, the Center for Inquiry set up an online Coronavirus Resource Center to help journalists and the public debunk false information and provide accurate resources.

Finally, there's another, less-recognized category: *information that is true but not helpful* on an individual level, or what might be called "trivially true." We usually think of false information being shared as harmful—and it certainly is—but trivially true information can also be harmful to public health. Even when it's not directly harmful, it adds to the background of noise.

News media and social media are flooded with information and speculation that—*even if accurate*—is of little practical use to the average person. Much of the information is not helpful, useful, actionable, or applicable to daily life. One example might include photos of empty store shelves widely shared on social media, depicting the run on supplies such as sanitizer and toilet paper. The information was both true and accurate; it was not faked or staged. But it was not helpful, because it leads to panic buying, social contagion, and hoarding as people perceive a threat to their welfare and turn an artificial scarcity into a real one. Another example was President Trump's reference on several occasions to the COVID-19 virus as "the China virus." It's technically accurate that COVID-19 was first detected in China—but it's not a relevant nor useful detail. It doesn't add to the discussion or help anyone's understanding of what the disease is or how to deal with it. If anything, referring to it by other terms such as the *China virus* or *Wuhan flu* is likely to cause confusion and even foment racism.

Overreacting and Underreacting

There have been many pandemics throughout history, but none have taken place during such a connected time—both geographically and via social media. There's a tendency to follow the news closely during times of emergency; especially when separated during isolation and quarantines, people are understandably desperate for information to keep their friends and family safe.

While scientists, doctors, nurses, epidemiologists, and others struggled to contain the disease, many other people were spending their self-isolating time on social media, sharing everything from useful information to dangerous misinformation to idle speculation. One thing most people could agree on was that other people and institutions weren't handling the crisis correctly.

There was much debate about whether Americans and governments were underreacting or overreacting to the pandemic threat. This is of course a logical fallacy, because there are some 330 million Americans, and the answer is that *some* Americans were doing one or the other; *most* Americans, however, were doing neither.

On social media, the issue of how and whether the threat was being exaggerated often broke along political party lines, with conservatives seeing the danger as exaggerated or an outright hoax. There were countless examples of divisive rhetoric, and many framed the pandemic in terms of class warfare (for example, pitting the rich against the poor) or spinning the outbreak to suit other social and political agendas. This was understandable but not helpful. Pointing out that the wealthy universally have better access to health care than the poor is merely stating the obvious—like much pandemic information, it's true but unhelpful. It's not going to prevent someone's family member from catching the virus and not going to open schools or businesses any faster. Liberals, conservatives, independents, and everyone else would benefit from putting aside the blame-casting, demonizing rhetoric and unite against the real enemy: the COVID-19 virus that was sickening and killing people across races and social strata.

At the same time, it was important to recognize that the measures taken to slow the spread of the coronavirus in America and around the world—while necessary and effective—had taken a disproportionate toll on minorities. As Charles Blow wrote in *The New York Times*:

> Social distancing is a privilege … this virus behaves like others, screeching like a heat-seeking missile toward the most vulnerable in society. And this happens not because it prefers them, but because they are more exposed, more fragile and more ill. … It is happening with poor people around the world, from New Delhi to Mexico City. If they go to work, they must often use crowded mass transportation, because low-wage workers can't necessarily afford to own a car or call a cab.

While each side likes to paint the other in extreme terms as under- or overreacting, there's plenty of common ground between these straw man positions. Most people were neither blithely and flagrantly ignoring medical advice nor spending their days in containment suits, terrified to go anywhere near others.

Idiots and Maniacs, Cassandras and Chicken Littles

People can take prudent precautions

and still reasonably think or suspect that at least some of what's going on in the world is an overreaction or underreaction. Policing other people's opinions or shaming them because they're taking the situation more (or less) seriously than we are is unhelpful. It's like the classic George Carlin joke: "Anybody driving slower than you is an idiot, and anyone going faster than you is a maniac."

Instead of seeing others as idiots and maniacs or panicky ninnies and oblivious fools, perhaps we can recognize that everyone is different. Some people are in poorer health than others; some people listen to misinformation more than others, and so on. Whether people were underreacting or overreacting is a matter of opinion, not fact. The truth, viewed from within the height of the pandemic, is that we simply don't know what will happen or how bad it will get. Both positions argue from a false certainty, a smugness that they know better than others do, that the Cassandras and Chicken Littles will get their comeuppance. Humans crave certainty, but science can't offer it. Certainty is why psychic predictions such as Sylvia Browne's (supposedly foretelling the outbreak, as mentioned in the May/June 2020 issue of SI) have such popular appeal. The same is true for conspiracy theories and religion: All offer certainty—the idea that whatever happens is being directed by hidden powers and is all part of God's plan (or the Illuminati's schemes, take your pick).

Instead of bickering over how stupid or silly others are for however they're reacting, it may be best to let them do their thing as long as it's not hurting others. Polarization is a form of intolerance. Maybe this is a time to come together instead of mocking those who don't share your opinions and fears. We all have different backgrounds and different tolerances for uncertainty.

Dueling Projections and Predictions

The record of wrong predictions about the coronavirus was long and growing by the hour. Around Valentine's Day, the director of policy and emergency preparedness for the New Orleans Health Department, Sarah Babcock, said that Mardi Gras celebrations two weeks later should proceed, predicting, "The chance of us getting someone with coronavirus is low." That projection was dead wrong: A month later, the city would have one of the worst outbreaks of COVID-19 in the country, with correspondingly high death rates. Other projections overestimated the scale of infections, hospitalizations, and/or deaths.

It's certainly true that many, if not most, news headlines about the virus were scary and alarmist; and that many, if not most, projections and predictions about COVID-19 were wrong to a greater or lesser degree. There's a plague of binary thinking, and it circulated in many forms. One claim involved a quasi-conspiracy that news media and public health officials were deliberately inflating COVID-19 statistics. Some said it was being done to make Trump look incompetent at handling the pandemic; others said it was being done on Trump's behalf to justify coming draconian measures, including Big Brother tracking.

It's certainly true that many, if not most, news headlines about the virus were scary and alarmist.

Many suggested that media manipulation was to blame, claiming that numbers were being skewed by those with social or political agendas. There's undoubtedly a grain of truth to that—after all, information has been weaponized for millennia—but there were more parsimonious (and less partisan) explanations for much of it, rooted in critical thinking and media literacy.

In many cases, it's not experts and researchers who skew information but instead the news media who report on them. News media and social media, by their nature, highlight the aberrant extremes. Propelled by human nature and (for social media, algorithms), they selectively focus on the worst in society—the mass murders, the dangers, the cruelty, the outrages and disasters—and rarely profile the good.

When news media cover natural disasters, journalists photograph and film the dozens of homes that were flooded or wrenched apart by a tornado, not the tens or hundreds of thousands of neighboring homes that were unscathed. This isn't some conspiracy by the news media to emphasize the bad, it's just the nature of journalism—they report on what is new or different. But this often leads to the public overestimating the terrible state of the world—and those in it—as well as fear and panic. Another problem is news stories (whether about dire predictions or promising new drugs or trends) that are reported and shared without sufficient context. One notable example of an unvetted COVID-19 news story that circulated widely concerned hydroxychloroquine, prematurely touted by Trump as a possible cure based on reports of a single French study of forty-two patients. Later studies failed to find evidence of the drug's efficacy, and in April, a Brazilian study of the drug was stopped when some patients developed heart problems.

Uncertainties in Models and Testing

In addition to media biases toward worst-case views and simplicity, experts and researchers often have limited information to work with, especially in predictions. There were many potential sources of error in the epidemiological data about COVID-19. Models are only as good as the information that goes into them; as they say: garbage in, garbage out. This is not to suggest that all the data is garbage, of course; it's more a case of incomplete data in, incomplete data out.

One example of the uncertainty of data was the number of COVID-19

deaths in New York City, one of the hardest-hit places. According to *The New York Times*:

> The official death count numbers presented each day by the state are based on hospital data. Our most conservative understanding right now is that patients who have tested positive for the virus and die in hospitals are reflected in the state's official death count … [however] The city has a different measure: Any patient who has had a positive coronavirus test and then later dies—whether at home or in a hospital—is being counted as a coronavirus death. … We also don't really know how each of the city's dozens of hospitals and medical facilities are counting their dead. For example, if a patient who is presumed to have coronavirus is admitted to the hospital, but dies there before they can be tested, it is unclear how they might factor into the formal death tally. There aren't really any mechanisms in place for having an immediate, efficient method to calculate the death toll during a pandemic. Normal procedures are usually abandoned quickly in such a crisis.

Because of multiple co-morbidities and risk factors, pinpointing an exact cause of death can be difficult. If a person with pneumonia contracts COVID-19 and soon dies, there's no way to know for certain whether he or she would have died anyway; listing it as a COVID-19 death is not unreasonable. While it might seem inconceivably Dickensian (or suspicious) to some that in 2020 quantifying something as seemingly straightforward as death is complicated, this is not evidence of deception or anyone "fudging the numbers" but instead an ordinary and predictable lack of uniform criteria and reporting standards. The international situation is even more uncertain; different countries have different guidelines, making comparisons difficult. Not all countries have the same criteria for who should be tested, for example, or even had adequate numbers of tests available.

Incomplete Testing

Some people complained that everyone should be tested, suggesting that only the rich are being tested for the virus. There was a national shortage of tests, and in fact many in the public *were* being tested, but such complaints rather miss a larger point: Testing is of limited value to individuals. Screening the entire asymptomatic public is neither practical nor possible. Furthermore, though scientists were working on creating tests that yield faster and more accurate results, the ones so far have taken days. Because many people who carry the virus show no symptoms (or mild symptoms that mimic colds or even seasonal allergies), it's entirely possible that a person could have been infected between the time they took the test and gotten a negative result back. So, it may have been true that a few days or a week earlier they hadn't been infected, but they are now and don't know it because they are asymptomatic. The point is not that the tests are flawed (though many were, and the British government wasted $20 million on faulty tests from Chinese companies), or that people should be afraid. Instead, it's that testing, by itself, is of little value to the patient because of these uncertainties. If anything, it could provide a false sense of security and put others at risk.

If you're ill, on a practical level—unless you're very sick or at increased risk, as mentioned above—it doesn't really matter whether you have COVID-19 or not because (a) there's nothing you can do about it except wait it out, like with any cold or flu; and (b) you should take steps to protect others anyway. People should *assume* that they are infected and act as they would for any communicable disease.

Certainty and the Unknown Knowns

Humans crave certainty and binary answers, but science can't offer it. The truth is that we simply don't know what will happen or how bad it will get. For many aspects of COVID-19, we don't have enough information to make accurate predictions. There are simply too many variables, too many factors involved. Even hindsight won't be 20/20 but instead be seen by many through a partisan prism. We can never know alternative history or what would have happened; it's like the concern over the "Y2K bug" two decades ago. Was it all over nothing? We don't know because steps were taken to address the problem.

But uncertainty has been largely ignored by pundits and social media "experts" alike who routinely discuss and debate statistics while glossing over—or entirely ignoring—the fact that much of it is speculation and guesswork, unanchored by any hard data. Most people don't know enough about epidemiology, statistics, or research design to have a good idea of how valid the disease data and projections are. It's difficult for many people—and especially experts, skeptics, and scientists—to admit they don't know the answer to a question. Even if it's outside our expertise, we often feel as if not knowing (or even not having a defensible opinion) is a sign of ignorance or failure. Real experts freely admit uncertainty about the data.

Humans crave certainty and binary answers, but science can't offer it.

One element of conspiracy thinking is that those who disagree are either stupid (that is, gullible "sheeple" who believe and parrot everything they see in the news—usually specifically the "mainstream media" or "MSM") or simply lying (experts and journalists across various media platforms who know the truth but are intentionally misleading the public for political or economic gain). This "If You Disagree with Me, You Are Either Stupid or Dishonest" worldview has little room for uncertainty or charity, and it misunderstands the situation.

The appropriate position to take on most coronavirus predictions is one of

agnosticism. It's not that epidemiologists and other health officials have all the data they need to make good decisions and projections about public health and are instead carefully considering ways to fake data to deceive the public and journalists. It's that they don't have all the data they need to make better predictions, and as more information comes in, the projections do get more accurate. The solution is not to vilify or demonize doctors and epidemiologists but instead to understand the limitations of science and the biases of news and social media.

Social Media Hygiene

While self-isolating from the disease (and those who might carry it) is vital to public health, there's a less-discussed aspect: Self-distancing from social media information on the virus, which is a form of social media hygiene. Six feet is enough distance in physical space, but it doesn't apply to cyberspace where viral misinformation spreads unchecked.

The analogy between disease and misinformation is apt. Just as you can be a vector for a virus if you get it, you can be a vector for misinformation and fear. But you can stop it by removing yourself from it. You don't need hourly updates on most aspects of the pandemic. Most of what you see and read isn't relevant to you. The idea is not to ignore important and useful information about the coronavirus; in fact, it's exactly the opposite: to better distinguish the news from the noise, the relevant from the irrelevant.

Doctors around the world were photographed sharing signs saying, "We're at work for you. Please stay home for us." That was excellent advice, but we can take it further. While at home not becoming a vector for disease—or even after restrictions are lifted—we can also take steps not to become a vector for misinformation. During a time when people are isolated, it's cathartic to vent on social media. Humans are social creatures, and we find ways to connect even when we can't physically. Especially during a time of international crisis, it's easy to become outraged about one or another aspect of the pandemic. Everyone has opinions about what is (or isn't) being done and what should (or shouldn't) be done. Everyone's entitled to those opinions, but they should be aware that those opinions expressed on social media have consequences and may well harm others, albeit unintentionally. Just as it feels good to physically hang out with other people (but may in fact be dangerous to them), it feels good to let off steam to others in your online social circles (but may be dangerous to them).

Just as people take steps to protect those with compromised immune systems, it may be wise to take similar steps to protect those with compromised psychological defenses on social media.

You don't know who will end up seeing your posts and comments (such is the nature of "viral" posts and memes), and while you may think little of it, others may be more vulnerable. Just as people take steps to protect those with compromised immune systems, it may be wise to take similar steps to protect those with compromised psychological defenses on social media—those suffering from anxiety, depression, or other issues who are especially vulnerable at this time. There are many ways to reach out to others and share concerns and feelings in a careful and less public way—through email, direct messaging, video calls, and even good old-fashioned letters. Like anything else, people can express feelings and concerns in measured, productive ways, ways that are less likely to harm others.

Though the public loves to blame the news media for misinformation—and often deservedly so—we are less keen to see the culprit in the mirror. Many people, especially on social media, fail to recognize that they have become *de facto* news outlets through the stories and posts they share. We cannot control what news organizations (or anyone else) publishes or puts online. But we can—and indeed we have an obligation to—help stop the spread of misinformation in all its forms. You can't do anything about how many deaths there are in China or Italy. You can't do anything about whether or not medical masks are being manufactured and shipped quickly enough. But you can do something about bad information online.

Social media hygiene can be as simple as not forwarding, liking, or sharing that dubious news story before checking the facts, especially if that story seems crafted to encourage social outrage. Before believing or sharing information on social media, ask yourself questions. Is it true? Is it from a reliable source? But there are other questions to ask: Even if it may be factually true, is it helpful or useful? Does it promote unity or encourage divisiveness? Are you sharing it because it contains practical information important to people's health? Or are you sharing it just to have something to talk about, some vehicle to share your opinions? The signal-to-noise ratio is already skewed against useful information, which is being drowned out by false information, speculation, opinion, and trivially true information. The best advice at the height of the pandemic and now: Be safe, practice social and cyber distancing, and wash your hands. ■

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[NOTES ON A STRANGE WORLD MASSIMO POLIDORO

Massimo Polidoro is an investigator of the paranormal, lecturer, and cofounder and head of CICAP, the Italian skeptics group. His website is at www.massimopolidoro.com.

Stop the Epidemic of Lies! Thinking about COVID-19 Misinformation

Since the coronavirus pandemic started, conspiracy theories, hoaxes, and fake news about COVID-19 have spread. Is it true that the virus escaped a Chinese military laboratory? Or was it created in an American laboratory just to hit China? Is it true that it was foreseen by a novel, by Nostradamus, on *The Simpsons*, or by the medium Sylvia Browne? And is it true that behind everything there was the mastermind of … Bill Gates?

In the past few months, we have seen and heard all kinds of conspiracy theories and hoaxes. Every single day brought a new one, and it would require at least a book to examine them all. However, the basic idea behind many of these claims is that *they are not telling us everything*, meaning that important information is kept hidden from us.

Especially during the early stages of the epidemic when the Chinese government proved reluctant to share the news, anyone could say anything—and it would be hard to disprove. Among the most common and enduring beliefs was the idea that the virus was artificially produced in a laboratory. It was said that a microbiological research center is located in Wuhan, China, the epicenter of the epidemic, that was supposedly involved in "China's secret biological weapons program."

Faced with statements of this kind, one must always ask: What is the evidence? Clearly, it is not theoretically impossible for a virus created in a laboratory to get out of control and spread outside causing disasters. But the question is: How do people who talk about it on Facebook or make videos or WhatsApp voice messages know that the coronavirus was created in a laboratory as part of a biological weapons program?

Well, it seems that the main source of this rumor is an Israeli secret service officer, Dany Shoham. The Israeli secret services, of course, are among the characters who never fail to indulge in conspiracy theories, even if in this case it is a *former* secret agent. Shoham gave an interview to the *Washington Times* (Gertz 2020)—not the *Washington Post*, the serious newspaper responsible for many investigations that revealed real conspiracies (starting with the investigation into Watergate, which led to the resignation of President Richard Nixon). No, here we are talking about the *Washington Times*, which is actually an extremist newspaper accustomed to feeding absurd conspiracy theories such as the idea that smoking doesn't actually hurt the lungs, that there is no climate change going on, or that former President Barack Obama was not American but instead African.

It is therefore not surprising that such a newspaper interviewed a character such as Dany Shoham. But back to the main question: What evidence did Shoham provide? He revealed that a top-secret bacteriological laboratory existed in Wuhan, the epicenter of the coronavirus. But actually, that's not really secret information, considering that three years ago *Nature* magazine dedicated an article to it and told about the research that takes place inside the lab (Cyranoski 2017).

What about the evidence that COVID-19 was created in a lab? And, specifically, in Wuhan's lab? Well … there is none. After all, Shoham is not new to these type of claims; in the past he had tried to get some publicity by spreading other conspiracy theories, which then turned out to be totally unfounded. This, of course, did not prevent TV and newspapers all over the world from picking up the fake news and reporting it as if it were real. But the job of a serious journalist is to inquire and verify before giving news. Go back to the source, ascertain where a video, photo, or recording comes from, who the people talking really are, their competences, and what they are really talking about.

Instead, some newspapers made no effort to ascertain the news and simply spread it instead. Why? Because obviously during an emergency, sensationalistic titles attract viewers, and maybe there will be more people who will click on their links, increasing advertising revenues.

But it is precisely because of journalists who do not do their job properly that traditional media—newspapers and TV—risk losing credibility and seeing their audience drop. And it is no wonder, then, that when people get information online, they absorb all kinds of nonsense.

It is true, in short, that often certain theories are born and propagate on social networks, but it is only thanks to traditional media—and particularly

television—that they often manage to assume a mass relevance that turns them into the subject of discussion.

Today, it is a lot more difficult to argue that coronavirus is an artificial product of a laboratory, because the structure of its DNA has been analyzed, and what can be seen excludes that it is an artificial product. For example, a study in *Nature Medicine* showed that on the entire COVID-19 DNA sequence, numerous randomly distributed point variations are observed that differentiate it from other known coronaviruses—a trademark of natural selection (Andersen et al. 2020). Contrary to the beliefs of conspiracists, if the virus had been created in the laboratory, it would not have been difficult to identify in well-located parts of its sequence, the insertion of entire blocks of foreign DNA, which is a trademark instead of genetic manipulation.

The origin of COVID-19, therefore, is natural. It is a virus that does not appear to cause problems in animals, but once it passes to humans—who are devoid of the specific antibodies with which to defend themselves—it can have lethal consequences. However, in the case of COVID-19, it is not yet clear which animals are involved in the species jump. Bats—which, like us, are mammals—are thought to have functioned as biological reservoirs: animals that usually do not get sick but can harbor several coronaviruses.

Also, based on this news, the hoax engine was immediately unleashed. For example, *Daily Mail*, a British tabloid newspaper, wrote that the virus was spread by Chinese people who eat bat soup. They also published a video (apparently) proving it (Thomson 2020). The news was immediately shared tens of thousands of times on the newspaper's social networks. But it is a classic example of misinformation that mixes authentic facts, taken out of context, and prejudices that confirm a certain vision of the world.

In this case, the video shows a Chinese woman eating bat soup. But she is not a victim of the virus but instead a famous travel blogger who is tasting a specialty of the Palau archipelago—far from China. Oh, and all this happened in 2016, four years before the spread of the coronavirus.

But the video takes advantage of the hypothesis that the virus comes from bats, and this can help create a narrative that fits in with a certain morbid and often racist Western curiosity about the eating habits of the Chinese people. A title such as "Revolting Footage Shows Chinese Woman Eating a Whole Bat at a Fancy Restaurant as Scientists Link the Deadly Coronavirus to the Flying Mammals" (Thomson 2020)—which is exactly what *Daily Mail* titled their story—is not totally false. But it's not even true.

The news story was a classic example of misinformation that mixes authentic facts, taken out of context, and prejudices that confirm a certain vision of the world.

The British newspaper the *Guardian*, in response to this way of presenting things, suggests going to YouTube and looking for videos of Westerners who feed on black pudding. You can find many such videos, but nowhere will you find one titled "Disgusting Footage Shows Englishmen Guzzling Pig's Blood as Europeans Depart Country in Disgust" (Wong 2020). It's not totally *untrue*, but it's also not *true*.

We should encourage the public to make it customary to ask for evidence every time claims are being made about health issues, such as the ones related to COVID-19. It is necessary to refer only to the facts that are scientifically ascertained. One should not listen to just a single scientist—who can always be wrong—but evaluate the complete set of studies. Although the studies were few at the beginning of the pandemic, and therefore the uncertainty was very high, now they are more numerous and allow us to improve the knowledge we have about this phenomenon every day.

Of course, those who leap to scientific certainties overnight perhaps do not understand how science works. Research needs to verify, test hypotheses, observe the evolution of phenomena, and replicate studies—all things that require time and patience, just as the development of a vaccine capable of protecting us from this type of virus will take time. In the meantime, let's avoid websites or "news" channels that scream sensationalism. Let's not share yet another hoax that we see circulating on social networks. And let's try to evaluate only objective and verified facts, referring, for example, to reliable sites such as that of the World Health Organization. (A list of resources can also be found at the Center for Inquiry's Coronavirus Resource Center, https://centerforinquiry.org/coronavirus/.)

This way, we will all do our small part in limiting the "infodemic" of misinformation, an epidemic that, unfortunately, at the moment has proven to be unstoppable. ■

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[REALITY IS THE BEST MEDICINE HARRIET HALL

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How You Can *Really* Boost Your Immune System

As fears of the new coronavirus disease (COVID-19) spread, alternative medicine was quick to provide false reassurance in the form of misinformation and bogus remedies. A recurring theme in complementary and alternative medicine—and a common mantra of those who make questionable health claims—has long been "boosting the immune system." In fact, this wrong-headed idea is so typical that boosting the immune system (or sometimes "supporting" the immune system) has become a red flag for quackery. It almost always indicates a misunderstanding of what the immune system is and how it works, and it fails to acknowledge that boosting the immune system could be counterproductive and in some cases might be exactly the wrong thing to do. The proponents of this idea never really explain what it is they are hoping to boost. And they never explain why the immune system would need support or how exactly that support would work. It's not like the aging breast that sags without support from a bra, and it's not like a wobbly rose plant or vine that gravity would pull to the ground in a heap without the support of a trellis.

If you are a normal healthy person whose diet provides the essential nutrients, your immune system will be able to perform its functions quite well; there is nothing you can do that will make it do a better job. As infectious disease specialist Mark Crislip wrote on the *Science-Based Medicine* blog, "The immune system is not a muscle, not a rocket, not a pump, not a balloon, nor anything else that can be inflated, expanded, or launched into the stratosphere by adding *more power*" (Crislip 2009).

You can indeed boost your immune system. I'll explain how you can do that, and it has nothing to do with all the vague, nonsensical, ignorant claims out there. But first, some background information is in order.

The immune system is a mind-bogglingly complex web of interconnected biological structures and processes. Working together, those components protect the organism from disease. There are actually two immune systems: innate and adaptive, both of which must distinguish between the body's own cells and foreign invaders. And there's also passive immunity, as provided to a newborn by the colostrum in its mother's milk and as antibody-rich serum injections. Passive immunity is a way for those who aren't actively producing their own antibodies to passively benefit from the antibodies of others.

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The Innate Immune System

Barriers. The first level of defense is provided by physical barriers such as the skin, augmented by nonspecific chemical barriers. Mucus traps microbes in the respiratory tract, and waves of cilia carry them away. Foreign invaders can be removed by coughing and sneezing or through sweat, tears, and urine. Antibacterial chemicals can be found in skin, saliva, tears, breast milk, and the vagina. The stomach kills ingested microbes with gastric acid. Beneficial intestinal bacteria outcompete pathogenic species. Even semen counteracts microbes with defensins and zinc.

Pattern recognition cells. These include macrophages, dendritic cells, mast cells, histiocytes, Langerhans cells, and Kupffer cells. They have receptors that can distinguish between molecules that belong to the body and those that don't. They initiate the process of inflammation, which attracts white blood cells and other phagocytes (cells that ingest and destroy pathogens). The body produces proteins called cytokines that mediate the inflammatory process with TNF, HMGB1, IL-1, and interferons. The complement system is activated to augment the inflammatory response. It consists of over thirty small proteins and protein fragments that work together in a cascade reaction. Another cascade reaction is the lectin pathway. And then there are at least ten toll-like receptors (TLRs), as well as inflammasomes and cytosomes. Not to speak of innate lymphoid cells such as natural killer (NK) cells.

I've already lost count, and this is just the innate system. You can begin to see just how complicated the immune system is and why a simple intervention is not likely to be effective. But wait, there's more! Much more.

The Adaptive Immune System

The innate system is common to all organisms, but the adaptive immune system is a later development in evolutionary history, appearing in vertebrates to allow the body to "remember" and respond to specific pathogens that it has encountered before. Vaccination depends on this memory. Antigens are recognized by a special type of white blood cell: lymphocytes. They carry receptor molecules that attach to small fragments of a pathogen (antigens) and process them in association with major histocompatibility molecules that recognize "self." Lymphocytes are divided into two types: B cells and T cells. T cells are further subdivided into killer T cells, helper T cells, and regulatory T cells. Activated T cells produce chemicals (cytotoxins) that kill foreign cells. Oh, and there are also gamma delta T cells with different receptors.

Vaccination depends on the "memory" of the adaptive immune system.

B cells present antigens and secrete antibodies. Their activation is enhanced by a series of chemicals. There are several types of B cell: plasmablasts, plasma cells, memory B cells, lymphoplasmacytoid cells, B2 cells, B-1 cells, and regulatory B cells. Antibodies are made up of two heavy chains and two light chains, with a variable region specific to an antigen. There are five major types of antibody: IgG, IgA, IgM, IgE, and IgD, with further subdivisions of some types. Millions of antibody molecules can be produced in a very short time.

Are you overwhelmed yet? Confused? As you can see, the immune system is insanely complicated. I've already listed the main components that make up the immune system, and there are more that I didn't mention; my list is not exhaustive. Research may show that an intervention can increase the amounts of one or more of these components, but no research has ever shown that such interventions result in a clinically significant outcome such as fewer infections. When a system is so complex, it's foolhardy to tweak a single thread in the web (assuming you could actually do that). There's a good chance it will have no significant effects on overall functioning or will have unanticipated effects that do more harm than good.

Immune Disorders

The immune response can be deficient or excessive. Immune deficiency can be due to severe malnutrition, genetic disorders such as severe combined immunodeficiency (SCID) as well as HIV/AIDS infections, or immunosuppressive drugs. On the other end of the scale, excessive immune responses can result in:

- Autoimmune disorders that attack the body's own cells, such as rheumatoid arthritis (RA) and type 1 diabetes.
- Allergies and hypersensitivity disorders (ranging from the runny nose and sneezing of hay fever to the potentially fatal anaphylactic reactions that can follow bee stings).
- Inflammatory diseases (celiac disease, inflammatory bowel disease, asthma, transplant rejection, and much more).
- Cancers related to chronic infections and inflammation, such as liver cancers caused by hepatitis B and cervical cancers caused by human papillomavirus (HPV) infections.

Inflammation: Both Good and Bad

When you cough with pneumonia, sneeze with a cold, experience pain with a boil, or run a fever, it's not the microbe itself that causes those symptoms; it's your body's own reaction—its efforts to deal with the bug.

We *need* inflammation; it initiates the healing process and leads to recovery from diseases and injuries. But it

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also causes a lot of harm. Inflammation has been linked to atherosclerosis, blood clots, pulmonary embolus, heart attacks, strokes, and a host of other problems. As Mark Crislip pointed out, "If some product is really boosting your immune system, it is really activating your inflammatory response" (Crislip 2009). And that could be a very bad thing. Boosting your immune system could kill you.

Fake Claims

Some of the claims are for practices their proponents say will boost the immune system, but they will not. They are things such as exercise, a good diet, and adequate sleep, which are good general advice for keeping the whole body healthy, but they have nothing specific to offer the immune system. If the immune system is already functioning adequately, they won't make it work any better. Nearly all alternative health practitioners claim that their treatments will improve immune function. Chiropractors claim that adjusting the spine will do the job. Acupuncturists imagine they can accomplish it by sticking needles in nonexistent acupoints to somehow facilitate the flow of your equally nonexistent *qi*. Homeopaths have much to offer: their top three "immunotherapy" remedies are allium cepa, gelsemium, and oscillococcinum. Oscillococcinum is a joke. It was the illusion of one man. It never existed in the first place, and even if it did, it would have been diluted out of existence in the preparation of the remedy.

One ad for a natural immunity product says, "Prevent flu virus from attacking your system with a stronger immune system." They are selling sachets for a plant-based natural drink mix with specially curated blends of these ingredients to boost immunity (to supposedly stimulate inflammation): baobab, orange, turmeric, and cami camu. And these ingredients to fight inflammation: turmeric and holy basil. So what are they trying to do? Promote or suppress inflammation? There's no evidence that their product can do either.

Dr. Seeds is selling turmeric powder with the claim that it boosts the immune system. Where's the evidence? A search for turmeric studies on PubMed indicates that the "evidence" is turmeric's ability to modulate inflammatory signaling pathways in preclinical studies and animal models (Kahkhaie et al. 2019). There are no significant studies of outcomes in humans. One review mentions the inflammatory signaling molecules NF-κB, JAKs/STATs, MAPKs, β-catenin, and Notch-1. These are all pathways I didn't even mention in my explanation of the immune system; they are more complications and evidence of the incredible complexity of the immune response. There's no clinical evidence that these components are important for human health.

Another advertised immune booster is colloidal silver to supposedly support you through the cold and flu season. It not only doesn't work, but it turns your skin permanently blue (Pickett 2017). There are a multitude of products advertised to boost the immune system: oil of oregano, probiotics, echinacea, black elderberry … . The list goes on; the evidence is nonexistent.

The term *boosting the immune system* is meaningless to anyone who really understands the immune system. It is only useful to help marketers deceive customers. The principle of "buyer beware" applies.

A Real Immune Booster

There is one way that you can actually boost your immune system: vaccines. They teach your immune system to recognize and fight off specific diseases. They do not cause generalized inflammation. They simply add more weapons to the adaptive immune system's arsenal. They train it to produce large numbers of antibodies if you encounter that specific infective organism again. Multiple vaccines don't overwhelm the body's immune system; they just exercise it, giving it more opportunities to carry out its normal functions.

Bottom line: vaccination works; other ways of "boosting the immune system" don't. ■

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Did Superstition Cause the COVID-19 Outbreak?

A Korean wet market. (source: Pixabay)

Prologue

Even before President Trump began calling it the "Chinese virus," the outbreak of sudden acute respiratory coronavirus 2 (SARS-CoV-2) and the disease it causes, coronavirus disease 2019 (COVID-19), set the occasion for a disturbing wave of anti-Chinese racism (Roy 2020). I am aware that, merely by writing about superstition and COVID-19, I might be accused of cultural imperialism or fueling racist views. To the contrary, if I am successful in this article, you will learn that:

- These outbreaks come from all over the world, not just China.
- While superstition may play a role in COVID-19, it is not as simple as you may think.
- Food superstitions—Chinese or otherwise—are not the only false beliefs that promote disease.
- The loudest voices against the promotion of these superstitions have come from within China.

There is more to this story than meets the eye.

The Wuhan Outbreak

In late February, as I was just getting up to speed on the novel coronavirus, I came across an article in *The New York Times*, "Why Did the Coronavirus Start in China: Let's Talk about the Cultural Causes of this Epidemic" (Lian 2020). Among other things, the author pointed to a variety of traditional Chinese beliefs about the healing powers of the meat and other byproducts of wild animals, which he suggested played a role in the epidemic. Although the exact origin is unclear, the current outbreak has been traced to a Wuhan seafood market—a "wet market"—in Hubei province. Wet markets exist all over the world, but in many Chinese markets, fish are gutted and other animals slaughtered onsite to guarantee freshness. They are called "wet markets" because the ground is often wet with melted ice from seafood displays and the blood of various species.

Most new epidemics begin when an animal pathogen is passed to humans for the first time. Due to the emphasis on freshness in Chinese wet markets,

live animals are sometimes housed in closely packed open cages where blood and animal droppings can easily intermingle, creating a fertile environment for viruses to pass among species and ultimately to humans. But before going further into the specifics of this outbreak, let's take a step back and look at the history of epidemics and pandemics.

Where Do Epidemics and Pandemics Come From?

Readers of Jared Diamond's Pulitzer Prize–winning book *Guns, Germs, and Steel: The Fates of Human Societies* (1997) understand that the European conquest of indigenous peoples in North and South America was less a function of superior military strength than it was a case of stronger immunities. The overwhelming majority of deaths among the native peoples of the Americas were from germs carried by the colonialists. Europeans had a much longer and more extensive history of living among domesticated animals, and as a result, they'd lived through a long string of epidemics and plagues, developing immunities along the way. When they arrived in the New World, Europeans carried smallpox and measles, and these diseases decimated the unprotected local populations.

Epidemics and pandemics typically begin when a pathogen moves from one species to another. Once they become communicable human diseases, their range depends upon human movements and behavior. Human and nonhuman animals come into contact all over the world, and as a result, major epidemics can arise almost anywhere. Table 1 shows the top five epidemics of the twentieth and twenty-first centuries ranked by number of fatalities. It is impossible to know the origin of smallpox because it has been around for at least three thousand years, and although it is assumed to have had some zoonotic (animal) beginning, long ago it became anthroponotic, meaning humans can transmit it to other animals. Smallpox was a devastating disease throughout human history until it was finally eradicated in the twentieth century by mass vaccination (Shchelkunov 2011; Breman et al. 1980).

Encephalitis lethargica, or "sleeping sickness," was portrayed in Oliver Sacks's 1973 book *Awakenings* and the 1990 film based on the book starring Robin Williams and Robert De Niro. Catatonic survivors of the 1915–1926 epidemic were given L-DOPA, the metabolic precursor of the neurotransmitter dopamine, and made dramatic recoveries—awakenings—only to discover that the effect was temporary. Because it emerged at the same time as the Spanish flu, one theory suggested the condition was caused by the flu virus, but the evidence does not support this conclusion. The cause of *encephalitis lethargica* remains unknown (Dale et al. 2004).

The other epidemics on this top five list all have zoonotic origins. There is some debate about how the Spanish flu began, but one popular analysis points to a British World War I base camp in northern France where live ducks, geese, and pigs were kept in close proximity to the troops (Oxford et al. 2005). HIV/AIDS is known to have transferred from monkeys and chimpanzees in west and central Africa. The Asian flu epidemic of 1957–1958 is thought to have resulted from the combination of an H1N1 human flu virus with an H2N2 avian virus—probably in a human host but possibly in another species (e.g., pig)—resulting in a new flu virus combining aspects of both (Belshe 2005).

In addition to these, the 2002 SARS outbreak started in China (Hsieh et al. 2005); the 2009 swine flu outbreak was traced to farms in central Mexico ("2009 Swine Flu" 2016); the 2013 MERS-CoV outbreak began in Saudi Arabia (World Health Organization 2020); and the 2014-2016 Ebola outbreak emerged in Guinea (Centers for Disease Control and Prevention 2019).

So, it is clear that deadly epidemics can and will come from almost anywhere on the globe. In addition, the choice to domesticate animals as a source of food has exposed us to additional zoonotic diseases. If we needed another reason to become vegetarians—or stop eating species that are genetically similar to humans—it might be to reduce our vulnerability to zoonotic diseases.

Table 1. *Top Five Epidemics of the Twentieth and Twenty-First Centuries*

Epidemic	Fatalities	Cause	Source
• Small pox	500 million (1877-1977)	*Variola* virus	unknown
• Spanish flu	100 million (1918-1920)	*H1N1* virus	probably Europe
• HIV/AIDS	32 million (1959-)	*HIV*	west Africa
• Asian flu	2 million (1957-1958)	*H2N2*	Hong Kong
• Encephalitis	1.5 million (1915-1926)	Encephalitis	Austria

Source: Wikipedia

The Chinese Wild Animal Industry

If there is a cultural component to the outbreak in Wuhan, there are two reasonable hypotheses: (a) the belief, grounded in traditional Chinese medicine (TCM), that certain foods and animal byproducts have unique powers to affect health, produce virility (in men), and fertility (in women); and (b) the promotion of exotic wild animals as luxury food items. The strong appeal of wild animals—grounded in these two cultural trends—may have a connection to the current SARS-CoV-2 outbreak.

Herbal remedies have been used to treat disease from the beginning of human history, and there are many traditional forms of medicine that have evolved in cultures throughout the world, including TCM, Ayurveda in India, and Kampo in Japan. In addition, there are traditional systems in Africa, Russia, and among the Aborigines of Australia (Yuan et al. 2016). Although orthodox forms of early American medicine were drawn from European medical schools, in the nineteenth century, the Thomsonian system of herbal remedies developed by Samuel Thomson (1769–1843) became popular—in part because the standard treatments of the day (e.g., bloodletting and purgatives) were quite brutal (Vyse 2015). Herbal remedies remain popular as alternative medicines, and although most are of unproven value, some of the science-based medicines we use today—typically in synthetic forms—originally came from plants and herbs. Famously, aspirin is a synthetic form of a substance derived from the bark of the willow tree, which was used for medicinal purposes for millennia (Goldberg 2019), and the drug artemisinin—used to treat malaria—comes from a Chinese herbal remedy that has also been used for thousands of years (Yuan et al. 2016). However, the great majority of medicines in TCM lack scientific evidence (The Editors 2007).

Of particular importance to the coronavirus outbreak are the use of substances derived from wild animals in TCM and the popular belief that wild and fresh animals have health benefits. Two of the animal substances that are particularly important to TCM are tiger bone and bear bile, both of which come from endangered species. Although almost every part of the tiger is considered healthful in some way, tiger bone is particularly popular due to claims it restores vital energy and protects against disease ("Traditional Chinese Medicine" N.d.). Tiger bone is often mixed with wine and sold at a high price (Rothman 2015).

Bear bile is thought to have a number of health benefits. The active ingredient in bear bile is ursodeoxycholic acid, which has been shown effective in the treatment of liver disease, but a synthetic form has been available for decades (Paumgartner and Beuers 2002). Nonetheless, in China, bears are farmed for the purpose of producing bile, and in early March of 2020—somewhat bewilderingly—China's National Health Commission listed bear bile as one of several treatments for COVID-19 (Fobar 2020). Of course, at this early stage, there are no proven treatments for COVID-19.

In China, there is an extensive bear farming industry widely known for its cruel treatment of Asian black bears. Bears farmed for their bile live their lives in individual cages that are often hardly bigger than their bodies, and bile is extracted from their gallbladders through an open hole in their bodies or a surgically implanted catheter (Li 2006). Wildlife activists in China have mounted campaigns to convince pharmacies to advertise their opposition to the sale of bear bile. Although farming bears is illegal in Vietnam, the practice has not disappeared, and bear farming remains legal in China. In addition, despite being protected by law, many other wildlife animals are offered as delicacies in markets and restaurants. They are assumed to have various health benefits, despite a lack of scientific evidence to back these claims.

Superstition and COVID-19

So, did superstition play a role in this novel coronavirus pandemic? Although we don't know the exact path of the SARS-CoV-2 virus, it is clear that unfounded beliefs about the benefits of different kinds of animal meats and byproducts, combined with the view of some people that freshly slaughtered meats are safer and more tasty than frozen, encourage traders to sell these products in the wet markets of Asia. This created an environment ripe for the transfer of pathogens among different species and ultimately to humans. To the extent that these beliefs—many of which are drawn from TCM—contribute to demand for these products, they are a public health hazard (Still 2003). However, the persistence of these unfounded ideas is encouraged by a number of larger forces that may be more powerful than mere cultural tradition.

Sun bear bile extraction operation in Mong La, Shan, Myanmar. Photo credit: Dan Bennett (Source: Wikipedia)

Peter Li, professor of East Asian Politics at the University of Houston-Downtown, points out that the Chinese government considers wildlife a resource, and wildlife breeding is a powerful and lucrative industry. Furthermore, the wildlife industry has presented itself as a pro-conservation effort, justifying the breeding of bears, tigers, and rhinoceros as a means to replenish endangered species. However, farming has not prevented the illegal hunting of wild species, many of which continue to decline in numbers (Li 2020). Following the 2003 SARS outbreak, which emerged from a live animal market in Guangdong providence, the Chinese government cracked down on wildlife trade for the exotic markets, but the restrictions were later relaxed.

On February 23, 2020, in response to the Wuhan outbreak, the Chinese government implemented a ban on all trade and consumption of wildlife (Li 2020), but given the government's track record and the sheer size of the industry, it is unclear whether the ban will last or ultimately be effective. Overcoming popular ideas will be difficult. A 2011 survey of Beijing residents showed that some were concerned about wildlife preservation and were willing to choose TCM remedies made from alternative substances, but a large percentage of respondents preferred medicines derived from wild animals because they believed them to be more potent and safe (Liu et al. 2016).

The Chinese government could have a positive influence by openly criticizing the unscientific ideas of TCM, but because TCM is so closely tied to the national identity, Beijing has not done so. As Li wrote in an email, "superstition and nationalism are mixed together to reinforce each other." Westerners who criticize TCM are likely to be labeled cultural imperialists, but many commentators, scholars, and scientists within China have long criticized the unfounded ideas of TCM. Unfortunately, political and economic forces exert a substantial influence. As I suggested in my previous column, it seems unlikely that the many references to superstition in the Chinese commercial market (e.g., red-colored products, lucky cats, the number eight, and feng shui) will ever disappear because they are sustained by the profit motive (Vyse 2020). Similarly, profit provides a strong incentive to promote Chinese live and wild animal markets using false claims of health benefits.

The Chinese government could have a positive influence by openly criticizing the unscientific ideas of TCM, but Beijing has not done so.

As to the question of superstition's role in the current SARS-CoV-2 outbreak, the water is further muddied by several more recent epidemiological studies (e.g., Huang et al. 2020; Li et al. 2020) identifying cases as early as mid-November of 2019 in people who had not visited the Wuhan seafood market. The 2003 SARS outbreak was traced to bats, which may have transferred the virus to civet cats that were sold at a wet market (McKie 2017), and it is a reasonable hypothesis that the current outbreak also stems from bats who either passed SARS-CoV-2 directly to humans or through an intermediate host animal. Bats, like us, are mammals, and they are sometimes eaten or found in close contact with humans and other animals. But at the moment, we don't know exactly where the SARS-CoV-2 virus came from or how it was transferred to humans. What we can say, however, is that the unfounded beliefs of TCM and the practice of breeding wild animals—often mixed with wild-caught but sick and injured animals—creates dangerously unsanitary conditions in China's wet markets. Where they exist, these markets are fertile incubators for new zoonotic diseases, epidemics, and pandemics, and every link in this pathogenic chain is supported by powerful economic and political forces.

Final Words about China

Although this particular outbreak began in China, we are all in this biological war together. After a slow initial response, Beijing made a quick reversal. Chinese scientists have done vital work on the genetics of the virus (Meredith 2020) and the epidemiology of the Wuhan outbreak and have promptly shared their findings with the rest of the global community (see the list of references on p. 24). Furthermore, China was not alone it its initial instinct to downplay the story. As the virus silently spread across the globe, leaders in the United States and several other countries made efforts to minimize the implications of the epidemic.

It is easy to be critical of the Chinese fascination with live animals, but ask yourself, when did you last slide an oyster—traditionally considered an aphrodisiac—down your throat, boil a live lobster, or pay someone to boil one for you at a restaurant? The Chinese may lead the world in false beliefs—encouraged and sustained by wildlife traders—about the benefits of certain kinds of animal parts, but they are not alone. I am old enough to remember the pork industry's "the other white meat" advertising campaign, which suggested that pork offered health benefits over beef (Levere 2005). Marketers all over the world will use any means available to increase profits, and false claims have rarely been a barrier. *Caveat emptor*.

Finally, the Chinese can be justifiably proud of how they quickly controlled the spread of SARS-CoV-2 in Wuhan. As I write this, deaths in China have dropped to single digits, and restrictions on movement in Wuhan are being relaxed (Kuo 2020). Some early observers of this remarkable success pointed to the tools of control available to China's authoritarian government, but at the time of this writing, similar results are playing out in South Korea, Taiwan, and Japan, all of which are democracies. If there is a secret to these successes, I would hypothesize that culture plays an important role. Asian collectivist philosophy is well-suited to the challenges of an epidemic. In many

of these countries, wearing face masks in public is a cultural norm, and family traditions instill a deep respect for elders—a valuable trait when a disease targets older people.

On March 13, 2020, *The New York Times* published tandem profiles of twenty-nine-year-old women, Wuhan healthcare workers, who came down with COVID-19 disease (We and Wang 2020). For reasons that are unclear, one of the women died and the other survived. As she recovered, Deng Danjing vowed to return to service in the hospital. "It was the nation that saved me," she said. "And I think I can pay it back to the nation." This sentiment is not common in the West. We are individualists, and we make up our own minds. But if we hope to minimize the carnage of this pandemic, the collectivism of Asian culture has much to recommend it. As the virus encircles the globe, infecting people without respect to ethnicity, race, class, gender, politics, or religion, it reminds us that we are all connected, and there are times when we all need each other. This is one of those times. ■

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Confronting Radical Uncertainty

A More Contemplative Way of Life in Our Post-Pandemic World

Across a few weeks in mid-March, American life was remade—whether temporarily or permanently, no one could say for sure. To stem the spread of the COVID-19 virus, states and cities closed schools and nonessential businesses, ordering more than 280 million Americans to shelter at home. With much of the economy coming to a sudden halt, the U.S. jobless rate quickly climbed to its highest level since the Great Depression as more than 22 million Americans filed for unemployment. By mid-April, even with social distancing restrictions in place, there had been 50,000 confirmed U.S. deaths. "The COVID-19 disease is highly contagious, selectively lethal, often indistinguishable from colds and seasonal maladies," wrote *The Wall Street Journal*. "For many, the isolation has been compounded by uncertainty. There aren't enough tests. There aren't enough hospital beds with ventilators. There is no vaccine, and no cure" (O'Brien and Bauerlein 2020).

In reaction to the escalating pandemic, I briefly went into a war-like mobilization mode, urgently thinking of ways that as an academic I could shift my research activities to directly study the unfolding crisis. But after a short time, I ran up against the barriers of reality. Sheltering at home with my wife and our six-year old son, I found myself paralyzed by the radical uncertainty of the moment. My situation was in sharp contrast to the heroes serving on the frontlines of the pandemic war, such as the grocery clerk, mail deliverer, first responder, and emergency room nurse, who each faced a far greater risk of infection. My job was also secure, unlike the tens of millions who were already out of work or the small business owners who had been shut down. And yet by noon on most days, my brain was completely scattered.

In reaction to the escalating pandemic, I briefly went into a war-like mobilization mode.

So, I decided to heed my inner voice, slowing down rather than accelerating ahead. With a sabbatical scheduled for Fall 2020, I decided that the best way I could help would be to immerse myself in a long-planned book project that explores the science and philosophy of

contemplation and what it means for a better way of life in a post-pandemic world, a topic I will be writing regularly about in Skeptical Inquirer.

I decided to heed my inner voice, slowing down rather than accelerating ahead.

Seeing Reality Clearly

Graduating from Dartmouth College in 1996, my career has followed a path familiar to many other alumni from elite universities. For nearly two decades as an academic, I have devoted myself to the relentless accumulation of credentials, networks, experiences, and achievements, consistently working seventy-hour weeks. Evenings and weekends were not opportunities to relax but instead a time to catch up on a backlog of research projects, dream up new ones, and write popular articles (like this one). Completing my doctorate in four years, by the age of twenty-seven I had landed a tenure-track position; by thirty-five I was tenured; and by my early forties I was a full professor.

After our son was born six years ago, I knew I had to cut back. But now work became not just about achievement but also about earning more money to support the family. Then, during a brutally cold New England winter in 2017, an alarm bell woke me from a lifelong delusion—a robot way of seeing, thinking, and doing that could have easily stretched for the rest of my life. For several months, I had battled excruciating nerve pain in my lower legs, which doctors eventually diagnosed as related to "muscle tension."

Years as a professor spent sitting at a desk, crouched over a keyboard, under chronic stress to meet the next deadline had taken their toll. As I slowly recovered, I switched to a standing desk, which helped considerably, but the experience had left me shaken, forcing me to question core aspects of my identity. Like so many in today's accelerated culture, I had seldom paused to think deeply about the value of a more contemplative, deliberate life and the costs associated with my hyper-speed existence. Life instead had always been about doing more, doing it better, and doing it for longer.

Similar to my educated peers in law, medicine, finance, or technology, I had been working an "extreme job," according to the *Harvard Business Review*: one requiring logging ten hours or more a day, 24/7 availability to clients and coworkers, frequent travel, work-related events outside regular hours, and a supervisory load normally handled by multiple managers (Hewlett and Luce 2006). And what would motivate such a life? For the poor and middle class in America, work remains essential to making ends meet. But for an educated elite, it has "morphed into a kind of religion, promising identity, transcendence, and community," observes journalist Derek Thomson (2019). One word sums up this condition: *workism*.

Yet finding oneself by way of an extreme job comes at an extreme cost. In contrast to the aristocracy of yore—who derived their wealth, status, and prestige from land, shipping, or factories—today's professional elite "cannot realize its income and status without devoting itself, almost single-mindedly, to competitive training and work," writes legal scholar Daniel Markovits (2019). A lifetime of investment in education and experiences creates a massive stock of human capital that can be translated into "fulfillment" only by way of an equally massive number of hours on the job each week. "The rich now work so compulsively because this is the only way to exploit their peculiar kind of wealth. Human capital more nearly enslaves than liberates its owners," writes Markovits.

Finding oneself by way of an extreme job comes at an extreme cost.

In my "The Examined Life" columns, I will be investigating the many twisted messages about human happiness and flourishing that have dominated our culture for decades if not centuries, along with the major thinkers, writers, critics, and researchers who have challenged them. To do so, I will be drawing on insights from the sciences, sociology, history, philosophy, literature, journalism, and other fields, reflecting on my experiences along the way.

I will be tackling not just our relationship to work and its many forms but also the excesses of the latest self-improvement and "life hacking" crazes, noting the costs to our health, relationships, communities, and politics. In our secular age, I will also be exploring the growing popularity of ancient philosophical traditions, such as stoicism, yoga, and Buddhism, along with other time-tested but too often forgotten practices such as spending time in nature, walking, working with your hands, deep reading, or simply being alone with your thoughts. I will also be training my lens on social media, mobile technology, and other technological innovations that enable all of us to be more connected than anytime in modern history but also more distracted, lonely, and misinformed. These topics and many others will all be part of the journey as I explore a better, more contemplative way of life in a post-pandemic world. ■

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[INVESTIVGATIVE FILES JOE NICKELL

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Alaska's Lady in Blue: How Baranof Castle Became Haunted

Baronof Castle, Sitka, Alaska, ca. 1893. The castle burned to the ground on March 17, 1894.

Among the earliest recorded ghost stories in Alaska is the tragic tale of the lovelorn bride of Baranof Castle. I encountered the promontory once topped by that historic site—and later learned of its captivating legend—when I arrived at Sitka in 2006 on a Center for Inquiry cruise.[1]

Baranof Castle

The great rock outcrop known as Castle Hill, now officially the Baranof Castle State Historical Site, provides a commanding view of Sitka Harbor and the surrounding city. Historically, families of a native Tlingit clan lived there, but after the Russian-American Company led by Alexander Baranov (or Baranof) sought to establish a trading post, war followed. Finally, the outnumbered Tlingits ceded the promontory to the colonizing Russians for their seat of government ("Castle Hill" 2018).

The Russians destroyed the Tlingit houses there and built a succession of frame buildings, then the two-story brick "castle" or Governor's House in 1836. It had a cupola that enabled it to also become a lighthouse (see photo). In 1867, Russian Alaska was acquired by the United States, and the transfer ceremony was held at the site. The castle was occupied by U.S. Army commanders for a decade, then remained an administrative center until it burned in 1894. Alaska statehood came in 1959, and—unofficially and in secret—the first forty-nine-star American flag was raised on the site ("Castle Hill" 2018).

It was there, in the days of the old castle, that the ghost story began.

Accurate details are hard to come by—and that is a story in itself.

The Legend

As early as the 1880s, there began to appear versions (or as folklorists say, "variants") of what we now recognize as the Blue Lady legend—although we must not be startled to learn that, initially, she was a ghost of a different color. The story is told in one of a series of travel letters that appeared in newspapers in 1883–1884 and were collected into a book two years later. Its author was a noted woman of her day, Eliza Ruhamah Scidmore.

We must not be startled to learn that, initially, the Blue Lady was a ghost of a different color.

Scidmore (1856–1928) was an American writer, photographer, and inveterate traveler who became the first woman to serve on the board of the National Geographic Society. In 1883, she spent some valuable time investigating the ghost of Baranof Castle. Scidmore's account begins by observing shrewdly that the "sad story" of the "beautiful Russian" lady "is closely modeled on that of the Bride of Lammermoor"—that is to say, on Sir Walter Scott's 1819 novel of that title. (The novel involves a young couple and another's plot to take advantage of the man's absence to trick the woman into an arranged marriage, with tragic consequences.[2])

Scidmore (1885, 160) writes of the Castle ghost:

> At Easter time she wanders with sorrowful mien from room to room, and leaves a faint perfume as of wild roses where she passes. Innumerable young officers from the men-of-war have nerved up their spirits and gone to spend a solitary night in the castle, but none have yet held authentic converse with the beautiful spirit, and learned the true story of unresting sorrow. By tradition, the lady in black was the daughter of one of the old governors. On her wedding night she disappeared from the ball-room in the midst of the festivities, and after long search was found dead in one of the small drawing-rooms. Being forced to marry against her will, one belief was that she voluntarily took poison, while another version ascribes the deed to an unhappy lover, while, altogether, the tale of this Lucia of the norwest isles gives just the touch of sentimental interest to this castle of the Russian governors.

Not only was the ghost originally the Lady in *Black*, but at the same time she was only a governor's daughter—although, as we shall see, she evolves in retellings into a Russian "princess."

Scidmore's account also contains another illuminating piece of information. At the time of her writing (1883), the castle had been long abandoned and neglected. Indeed, she writes, it "has been stripped, despoiled, and defaced … and the place is little better than ruin." I think this is very important as it suggests how the place began to be "haunted." Many times I have traced what I call "the abandonment-creates-haunted-place phenomenon" (Nickell 2017). A site without any apparent ghost becomes abandoned and run down until it looks like a dark and spooky place. Soon there are whispers of ghosts, and people are dared to visit and even spend the night.

Many times I have traced what I call "the abandonment-creates-haunted-place phenomenon."

This is apparently just what happened with Baranof Castle. Scidmore goes on to state that the local Russian residents "cannot identify this ghost with any member of the governors' families, and say that the whole thing has been concocted within a few years to keep sailors and marauders away at the night, and to entertain the occasional tourist."

The Lady in Blue

Other sources have recounted the story of the castle ghost, including one "in the early eighties" by Frederick Schwatka, reprinted in *Alaska News*, December 24, 1896. I first came upon the tale in a book *Strange Stories of Alaska and the Yukon* (Ferrell 1996, 7–71), and it quoted a passage from John Arctander's *The Lady in Blue* (1911).

This is the fullest, book-length elaboration of the legend, and it purportedly derives from an "old yellow manuscript" of a late Army chaplain named Cramer. However, while it appears to give the tale an earlier history, the "old manuscript" is a well-known literary device (like Poe's "Ms Found in a Bottle" or the recounting of a legend in Conan Doyle's *The Hound of the Baskervilles*), which allows the author to create a story within a story. I was suspicious that it was fictional, and in examining the questioned text (that of the purported old manuscript) in comparison with that of author Arctander, I found such similarities as to persuade me that Arctander wrote it all.

Specifically, I assessed the similarity of the "two" texts by first conducting a standard readability-scale analysis of each. This measures the length of words and sentences to provide an indication of the education level of the intended audience and, by inference, of its author (Bovée and Thill 1989). For accuracy, I chose two sample passages from Arctander and two from the purported chaplain's manuscript, and I averaged the results.[3]

The indicated education levels, for Arctander 14.5 and for the chaplain 15, were remarkably close and show that both were consistent with the same level of fifteenth grade—that is, college junior, and therefore common authorship. (Naturally, Arctander would have been writing for a popular rather than scholarly audience.)

As it happens, both Arctander and his "manuscript" writer produced uncommonly long sentences—the former as long as 127 words and the latter one

As it happens, both Arctander and his "manuscript" writer produced uncommonly long sentences—the former as long as 127 words.

of 92. In each, the longest sentences were a single paragraph.

There are other similarities between the two writings. The purported manuscript sometimes uses an outdated British form of double punctuation—a colon, comma, or other mark immediately followed by a dash. This is said to have lingered in British legal documents ("English Language and Usage" 2018). While the usage might seem to support the antiquity of the manuscript, the telling fact is that Arctander (1849–1920) was born in Sweden and apparently learned English at a university in Norway. He became an American attorney of some note.

Arctander (1911, 13) knows the high quality of the writing in the old manuscript—after all, he wrote it!—and he has fun with this by having the purported chaplain's son-in-law say, "The old gentleman must have been as good a writer in his younger days as he was a preacher when I first met him … ." Indeed, Arctander really acknowledges the pretense of the whole thing by labeling the book, in its subtitle, "A Sitka Romance"—a romance being "any long, fictitious tale of heroes and extraordinary or mysterious events" (Morris 1970). Never mind if others might mistake his book for history rather than fiction.

Conclusions

Some have tried to make the ghost a real person—attributing her to this or that earlier Russian administration. Like Arctander, writers have promoted her to "princess" and suggested that she was "cruelly separated from her true love and forced into a loveless marriage"; however, "Apart from that, storytellers don't seem to agree on much, including whether the ghost loiters about in a black, blue, or white dress" ("Ghost" 2015).

Numerous such story variants—e.g., the lady took poison, stabbed herself, or was murdered (Scidmore 1885; "Ghost" 2015)—reveal the narratives to be folklore and/or fakelore at work. We learned from Scidmore (1883) that the tale grew out of the period when Baranof Castle was abandoned, and so it became a spooky place where young soldiers gathered the courage to spend a night. She said this began "after the troops left," which was 1877 (Andrews 1922, 24). Therefore, we can place the probable time of the ghost story's origin to 1877–1883. (It might have been earlier, but there is no prior version in print, so I think Scidmore's statement—that local residents say it was concocted "within a few years" of abandonment—is credible.)

Numerous story variants—e.g., the lady took poison or was murdered—reveal the narratives to be folklore and/or fakelore at work.

While the tale seemed historical, recall that locals could not "identify this ghost with any member of the governors' families" (Scidmore 1885, 160). Another source adds skeptically, "One might also imagine that the presence of a Russian princess in Alaska might have been commented on by more historians over the years" ("Ghost" 2015). So, what appeared *historical* only resulted from the narrative having been *set back in time* (as Arctander and others did) when it was, in fact, simply made up. ■

Acknowledgments

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Notes

1. The cruise, featuring our "Planetary Ethics" conference, snaked from Seattle along the coastal reaches of British Columbia and southern Alaska. I spoke on "Mysterious Entities of the Pacific Northwest" and, as opportunity allowed when we pulled into ports, did some on-site investigating (Nickell 2007a; Nickell 2007b).

2. Scott's novel has a more complex plot, however, and the bride's name is "Lucy," not "Lucia."

3. For Arctander, I chose a 119-word segment, pp. 9–10, "Southwestern … archipelago"; and another of 112 words, p. 7, "I had … else." For the "Manuscript," I selected passages of 106 words, pp. 24–25, "Reaching … hallway"; and 110 words, pp. 22–23, "How long … skirt." Arctander's level was 14.5 (the average of 15 and 14), and the chaplain's manuscript was 15 (the average of 17 and 13). Note that even within a given person's writing, there can be significant variation, which is why I did the analysis twice and produced an average.

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or co-author of a dozen books, including *Investigating Ghosts: The Scientific Search for Spirits*.

Tracking the Chupacabra: Twenty-Five Years Later

Q: **What's new with the chupacabra? I know you wrote the book on it, but what's happened since then? Are there any new developments or sightings?**

—R. Vanover

A: Monsters and cryptozoological curiosities are strange enough, but even among that elusive lot (Bigfoot, Nessie, Champ, etc.), the chupacabra is an odd duck (-sucking thing). Not only is it the only vampire among them (said to drain the blood of goats, fowl, and other animals), but it's also the only one that has significantly changed shape over the years, appearing in at least three distinct forms (humanoid alien, canid, and varied "other," including raccoons).

It's also a strapping young pup of twenty-five. The original eyewitness, a Puerto Rican woman named Madelyne Tolentino (Figure 1), described the creature (see Figure 2) in August 1995 based on a monster she'd seen in the sci-fi/horror film *Species*. In the months after her sighting, the island was abuzz with rumors, tabloid stories, and reports about the beast. Armed mobs patrolled streets searching for the creature, and the mayor of Canóvanas, Jose "Chemo" Soto, courted local press (and votes) promising to protect the public from the terrifying menace.

However, as the years passed and no hard evidence of the monster surfaced, interest waned. The chupacabra was culturally appropriated by the rest of the world via *The X-Files*, tabloids, and television shows, and by the time the first dead canid version appeared on a ranch in Nicaragua in 2000, it had largely faded from Puerto Rico as a threat. The chupacabra was soon commodified, resembling Tolentino's original sighting less and less with each passing year.[1]

I recently revisited Puerto Rico, shooting an episode of the Discovery Channel show *Expedition Unknown* (season 6, episode 605) with Josh Gates (Figure 3). While there, I was curious to see what the creature's status was; I had last been there in 2010, interview-

Figure 1. Original chupacabra eyewitness Madelyne Tolentino at her former home in Canóvanas, Puerto Rico, where she reported seeing the creature in 1995. Photo by the author.

Figure 2. Illustration by the author depicting the chupacabra that Tolentino reported seeing.

ing Tolentino and researching my 2011 book *Tracking the Chupacabra: The Vampire Beast in Fact, Fiction, and Folklore*. I was told that the show's producers had sought an interview with the mayor of Canóvanas, Lornna Soto Villanueva, to talk about what is arguably the island's most famous export (aside from rum) and what is certainly the single most famous event to happen in that municipality.

Unlike her father Jose Soto—who eagerly promoted the chupacabra and used fear of the creature as a political platform—Soto Villanueva refused to have anything to do with the topic. She didn't want to be interviewed or comment on it at all; I got the sense that she was embarrassed by it and saw no political or personal benefit in bringing it up. That's understandable given the myriad disasters the island has faced in recent years, including economic ruin, mismanagement, hurricanes, presidential visits, earthquakes, crumbling infrastructure, and so on. Puerto Ricans have far graver concerns than decades-old legendary vampire monsters.

In chatting with locals in a few small towns and the capital of San Juan, I asked in several tourist shops for any chupacabra merchandise. The fears and chuckles I'd encountered in 2010 were replaced by shrugs and blank stares. One man behind the counter said he hadn't heard about it in years; I realized he'd have been a toddler during the chupacabra's heyday. I might as well have asked if they sold any T-shirts featuring Vanilla Ice shouting "Loose the Juice!" while doing the Macarena.

These days the chupacabra is mainly of interest to mystery lovers and cryptozoologists (those who search for unknown or hidden animals). What was once a feared beast has become a fading footnote, a calcified curiosity. Like all mysteries (including comparably debunked ones such as the Bermuda Triangle), it will never be forgotten but—like any vampire worth its garlic salt—instead resurrected now and then.

I get Google news alerts for *chupacabra* and thus still hear about it a few times a year when some unknown animal (usually a mangy dog or coyote) is spotted and makes the news somewhere in the world. It's briefly discussed, typically with no real investigation or scientific follow-up, and soon forgotten until reappearing as discussion fodder for Facebook mystery forums. Plus, of course, cable TV perpetually recycles topics—more often than not without a hint of skepticism (*Expedition Unknown* being a welcome exception in this case)—thus ensuring rerun revivals.

I've jokingly referred to myself as the chupacabra slayer, though my goal was never to destroy or debunk the creature or its story but instead to explain and understand it—whether as a folkloric figure or Fortean reality. It was a satisfying, multifaceted mystery, and I'm glad to have tackled it. Mysteries don't lose their intrigue or value merely for having been solved. Examining specific solved mysteries and deconstructing how and why they emerged can tell us much about mysteries in general, as well as give insights into psychology and sociology. This is why reading skeptical investigations remains rewarding years and decades later—and back issues of Skeptical Inquirer often remain relevant and informative.

If chupacabras (or Bigfoot, Nessie, and their brethren) are real animals, then any day now—maybe next week or next year—hard evidence will be found in the form of a body, which will spur scientific discoveries (and require extensive revisions to my book). Until then, that's what the chupacabra has been up to—and always will be. ■

Note

1. Some have wrongly claimed that the chupacabra predates 1995 by years or decades (or even centuries; see my article "Mistaken Memories of Vampires: Pseudohistories of the Chupacabra" in the January/February 2016 issue of SI). However, this is mistaken; there were, of course, pre-1995 reports and stories of vampires, both in Puerto Rico and around the world. However, the specific version that would become the chupacabra—with that unique name, location, and description—first appeared in 1995. Or, for those who prefer a more technically accurate version, "a type of vampire called the 'chupacabra,' with several distinct characteristics associated with it, both at the time and later" was first reported in 1995.

Figure 3. The author and Josh Gates interviewing an eyewitness in rural Puerto Rico while shooting an episode of *Expedition Unknown* in 2019.

EXPLORING *POSSIBLE WORLDS* WITH ANN DRUYAN

ROB PALMER

The universe that science reveals is so much more amazing than our ancestors could ever have anticipated, because they had never seen the curtain of darkness peeled away … and actually seen the vastness and begun to know something of just how big it all is.

—Ann Druyan

Being a huge fan of the original 1980 *Cosmos* with Carl Sagan, as well as the 2014 version with Neil deGrasse Tyson, I was thrilled to discover that a brand-new 2020 season of *Cosmos* was airing, and I had many questions. So, I talked to CSI Fellow Ann Druyan, the creative force behind the series, to obtain some behind-the-scenes info for Skeptical Inquirer readers.

Cosmos: Possible Worlds is available in over 170 countries, including on the National Geographic Channel. Fox has made it part of its new fall season. The thirteen-episode series will premiere on Fox on September 22, 2020, at 8 p.m.

Ann, for those not very familiar with you, can you tell us about some of the highlights of your career?

Sure. It was my honor to be the creative director of NASA's *Voyager* interstellar message, to collaborate with Carl Sagan on *Cosmos: A Personal Voyage*, and on cocreating [the movie] *Contact* with him. I was also executive producer, writer, and director of *Cosmos: A Space Time Odyssey* [the 2014 series] and *Cosmos: Possible Worlds*. I'm also the author of the companion book Cosmos: Possible Worlds.

What would you say are the main differences between this third season of *Cosmos* and the earlier season that ran in 2014?

I think during season three—during the conceiving of it, the writing of it with Brannon Braga, and then my writing of the companion book—I was moved by a greater sense of urgency. I don't have to spell out to you or your readers why that was, because we're all painfully aware of it. … I wanted to create something that had a vision of a hopeful, but not an unrealistic impossible, future—the future that we could still have if we got our act together … if we started changing our priorities and using science and high technology with a long-term vision of protecting the planet.

And it's a dream that I wanted to convey, because we have that power to do these things. We live in a moment where the input of scientific discovery is like a fire hydrant. And of course, at the same time we're not nearly as wise as we are clever. We seem to have taken a great leap backward. And I just wanted to inspire other people to work for the future that I think is worthy of our kids. That was the difference.

Neil deGrasse Tyson was on the *Late Show with Stephen Colbert* earlier this year talking about the fiftieth anniversary of Earth Day on April 22. He connected the fact that there was an Earth Day to the Apollo moon landings and the fact that humans saw Earth for the first time from a distance. What are your thoughts on that?

That's an idea that Carl wrote about in an essay titled "The Gift of Apollo," and it was exactly that sense of self-awareness that Earthlings were able to glean from that beautiful frame-filling Earth. And then I think we made another even greater leap with the Pale Blue Dot image that *Voyager 1* took, because it was far more realistic. It wasn't a frame-filling planet, but it was just a tiny pale blue dot. To me, that's really the most profound image.

And I'm hoping that just as Carl wrote decades ago about the way that Apollo influenced our sense of the Earth as a single organism … I'm really hoping that the Pale Blue Dot image will permeate consciousness and move us to protect this tiny planet that is so astonishingly beautiful, diverse in its landscapes and seascapes, and filled with life.

There's something else that the Space Age did for our civilization, and that is it unified the sciences in a way that was actually necessary. Because it wasn't until Sputnik and the space missions that followed that the wall between the scientific disciplines came down. It's a story that hasn't really been told before, and I'm very proud to tell it in the book and on the show.

In which episode was that story covered?

It's in episode six. "Man of a Trillion Worlds" tells the story of when Carl was a young student, there was no scientific periodical on Earth in which a geologist could talk to a biologist or a chemist could talk to a biologist. There was such a separation of the sciences. But of course, when you begin to explore other worlds, you have to take everyone along on that trip, because the chemist, the geologist, the biologist, and everyone else has a part in that exploration. But that wasn't true as long as we were Earthbound.

It's a recent and yet a forgotten time. Carl was actually editor of *Icarus*, which was the first interdisciplinary scientific journal, and that represented a real seed change in science. So now, scientists from many different disciplines got together and cross-fertilized each other with their knowledge and ideas.

Speaking of "Man of a Trillion Worlds," your daughter plays Carl's mom—her own grandmother—in that episode.

Yes, it's true … when I was thinking of who could play Rachel, I thought of the person that I knew who resembled her and also had taken some of her greatest qualities forward. So that's why I chose Sasha, and she did a great job. She was a perfect Rachel. And actually, she has a recurring role in the season.

There are some well-known names who voice the characters in the animations.

Yes. Patrick Stewart is William Herschel. And the great Viggo Mortensen plays Nikolai Vavilov. A lot of great talent has been attracted to *Cosmos* because of its significance and the place that it holds in people's hearts. So, we've been able to attract the VFX supervisor, legendary in the motion picture industry, Jeff Okun, and so many stellar talents who really gave everything they had to *Cosmos*.

In the first episode, Tyson walks into the Halls of Extinction and reveals the name of the latest extinction hallway for the first time: "Anthropocene," but then we quickly go on to another topic. Was that a tease for another episode?

Yes. I like to put Easter eggs for the rest of the season in the first episode. The seeds of the whole season are scattered through it.

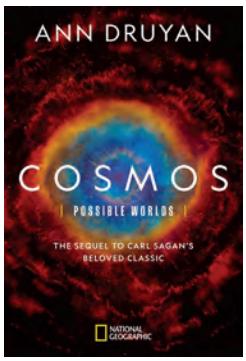
In that episode, there was also an awe-inspiring scene with something called Project Starshot with 1,000 spacecraft all leaving Earth to explore space at the same time. Where did that idea come from? Is that something actually being contemplated?

Yes. This is a real project that I have a very tiny, tiny association with. I'm on the advisory board. The organization is Breakthrough Starshot, the same people who do the Breakthrough Prize. The project began about five years ago, and at that time Stephen Hawking was part of it, along with several other luminaries. And it's being worked on as we speak. It's a real thing!

I loved it when, also during the first episode, Tyson said, "Our Ship of the Imagination is propelled by twin engines of skepticism and wonder."

I'm very proud of that line, because that's the point. You don't have to have one at the expense of the other … an equal measure of both always. For me, science and skepticism were the means to have the greatest spiritual experiences of my life. And every one of them was about having a somewhat deeper sense of the romance of being alive in the cosmos and the beauty of nature.

The universe that science reveals is so much more amazing than our ancestors could ever have anticipated, because they had never seen the curtain of darkness peeled away … and actually seen the vastness and begun to know something of just how big it all is. And that's an impoverishment, I think.



Tell me about the companion book you wrote. What are the differences between the *Cosmos: Possible Worlds* book and the TV show?

There are a couple of differences, but the central one is that when you're producing and directing a show that's under an hour, you have to be cognizant of the very strict limit on the amount of time you have. Whereas in a book, I could tell much more about what I knew about these stories and go into much greater detail. That's the major difference. The book has allowed me to explore more deeply into the lives of some of the people that you've never heard of but you should have.

So, we have to talk about what's going on in the world right now. [Note: This interview occurred on March 18, 2020.] The new series has a very hopeful vision of the future, and this pandemic makes it a little difficult to see our future as rosy. Could this global disaster have been prevented?

Well, how did we get here? We got here because the people who lead us had nothing but contempt for science. Purge the government departments of scientists who reported their findings without fear of offending the president. Fire the virus rapid response team that scours the globe looking for the next outbreak. Fire them. What do you need them for? What do we need [an emergency supply of] respirators for? Why do we need to be prepared for a massive outbreak that's been predicted for decades?

So, why are we in this situation? It's because nobody in the government was paying attention, and we're all paying for this now in our quarantines, in our fear, in our lost work. And in all the things that this has cost us. It's clear that trillions of dollars of wealth have been lost. For what? Because somebody didn't think that it was important … that public health was important … that public health should be a major focus of our attention and our resources. And it's a shameful situation. And it's all part of a massive contempt for science … fear-based thinking … a complete abandonment of reality. For what?

I feel that it would be great if some of the searchers—the scientists that we bring to life in *Cosmos* and that I write about more extensively in the book—these people who were so courageous and brilliant and selfless … that if we knew their names, maybe if we admired them instead of being completely obsessed with people who just shop all day long, it would be really amazing. And we could begin to actually set our country, and the world even, back on course for a better future.

What developments are you most optimistic about for the future?

One of the things that I love, and I'm fascinated by, is some of the solutions to the problems that we view at this moment as being intractable. In our vision of the future, when we take you to the 2039 World's Fair, you will see how we used our science to heal the planet in a variety of different ways. All these ways are feasible; none of them are theoretical. They are real solutions that we could pursue if we felt as strongly about our planet, its environments, the other life forms … if we felt as strongly about each other as we do about things that are just mere abstractions, like money.

This is the challenge that humans face: How are we going to get to the point where we value the things we need to exist as an organism: water, air, a favorable climate … those things that we need to live? How are we going to prioritize them above the other things that we're so fascinated with? That's the big question.

Credit: National Geographic, FOX

Ann Druyan married astronomer, author, and science popularizer Carl Sagan in 1981. Photographer: Tony Korody, Courtesy of Druyan-Sagan Associates

And if we're willing to do that, if we're willing to change and adapt, which is the entry level requirement of any organism … the ability to adapt … in eons gone by that was our greatest talent … our ability to adapt and shape the environment to our needs. Well this is another moment when humanity has to step up. And the good news is that all of us are descended from generations, countless generations, of humans who had their backs to the wall and who managed to endure and to survive and even to flourish. And that's what we have to do. It's our turn … . As far as I know, this is our one and only life, our one and only time to make a difference and to do what we must to make it possible for the next links in the chain of generations to be strong. We have to do that. And everything else I think is not as important.

The dream of *Cosmos* is that science is a birthright that belongs to every single person. And the more people who have this knowledge, and the famous baloney detection kit that it brings you, so that you cannot be so easily manipulated … that's really our hope for the future. And that's why I was really so inspired to write the book and to make the TV show.

Here's an out-of-left-field question: Would you like to talk about 4970 Druyan and 2709 Sagan?

Oh, I would love to! Just think how romantic it is that my late husband and I have asteroids named after each of us that are in perpetual wedding ring orbit around the sun. Imagine: one orbit. And then imagine that the orbit of the other asteroid goes in and out of the other's orbit. So, if you had two wedding rings that were linked together, that's a wedding ring orbit. My asteroid was discovered by a wonderful astronomer named Eleanor Helin. I am so honored by this; I think of this a lot. I'm looking now at the plaque that was presented to me on Carl's sixtieth birthday, where Eleanor wrote "Asteroid 2709 Sagan in eternal companion orbit with asteroid 4970 Druyan, symbolic of their love and admiration for each other."

Finally, are you planning another season of *Cosmos*?

Yes! I very much have season four in mind, and I know what it's going to be. And I even know some of the stories that I want to tell in it. But I'm going to take a little bit of a break. Thanks to the coronavirus, so is everyone else for a little while. But I do intend to do a fourth season. ■

A longer version of this interview is on Skeptical Inquirer's website at https://skepticalinquirer.org/exclusive/exploring-possible-worlds-with-ann-druyan/.

Unless otherwise noted, photos in the article are from *Cosmos: Possible Worlds* and are used courtesy of Cosmos Studios.

For Further Reading

In the Skeptical Inquirer:

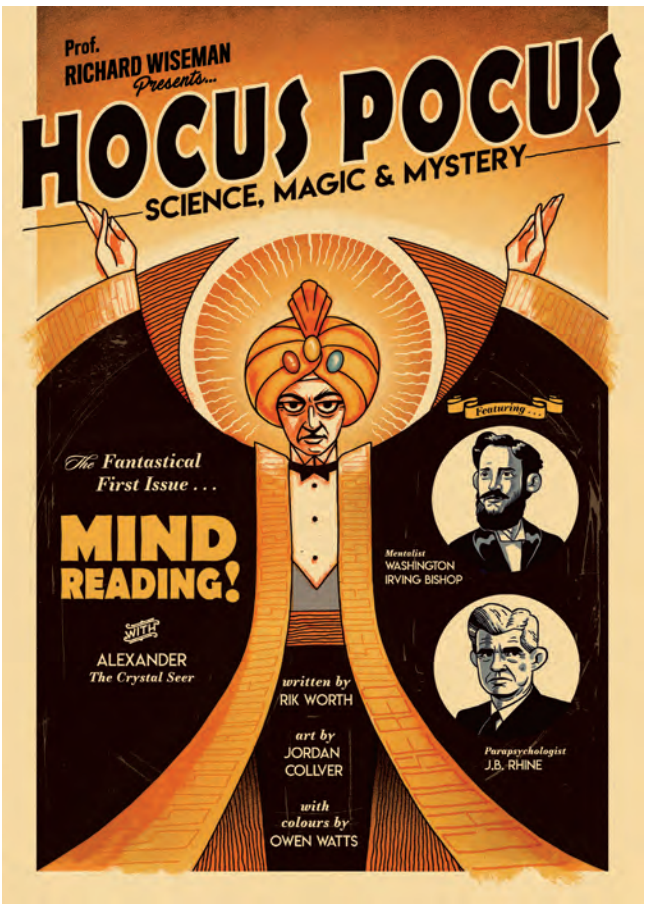
"It's the Carl Sagan & Ann Druyan Theater," January/February 2020
"On the Set of *Cosmos*'s Season Two," September/October 2018
"Ann Druyan on the Wonder of *Cosmos*," September/October 2014
"The Great Turning Away," Ann Druyan, July/August 2005
"Ann Druyan Talks about Science, Religion, Wonder, Awe … and Carl Sagan," November/December 2003

Rob Palmer is an aerospace engineer, Guerilla Skeptic, and skeptical activist who writes "The Well-Known Skeptic" column for SI's website at skepticalinquirer.org.

HOCUS POCUS: BRINGING SKEPTICISM TO NEW AUDIENCES VIA COMICS

A new comic presents a visual, skeptical take on paranormal stories.

RICHARD WISEMAN



From popular books to public lectures, television shows to radio programs, and magazine articles to blogs, skeptics have worked hard to promote critical thinking about the paranormal. However—perhaps surprisingly—they have tended not to use one of the most visual, immersive, popular, and entertaining forms of storytelling.

Several years ago, I teamed up with illustrator Jordan Collver and writer Rik Worth to create some novel and eye-catching optical illusions for my Quirkology YouTube channel. Collver and Worth specialize in using graphic art and comics to help communicate science, and I suggested that the three of us produce a comic that promotes skepticism and critical thinking. They were open to the idea, and we started to discuss how it might work.

We knew that the paranormal has broad appeal, and so we decided to create a comic that focused on seemingly impossible phenomena, such as psychics, ghosts, prophesy, reincarnation, mediums, and the like. However (unlike many other magazines about the paranormal) our comic was designed to present a much more rational and skeptical approach to these topics.

We decided to call the comic *Hocus Pocus* and dedicate our first issue to mind reading. In one story, readers travel back in time and meet the Victorian performer and mind reader Washington Irving Bishop. During his shows, Bishop invited a spectator to hide an object somewhere in the venue. Next, he held onto the spectator's hand or wrist, asked the spectator to think of the secret location, and then led the spectator to the object. In 1889, Bishop appeared to fall into a coma during a performance in New York City and die. The following day, physicians performed an autopsy on Bishop in the hope of studying his seemingly remarkable brain. Unfortunately, Bishop apparently suffered from cataleptic fits and carried a card on him stating that nobody should carry out an autopsy on him until at least forty-eight hours after his apparent death. Our magazine tells Bishop's remarkable story and explains how his seemingly inexplicable performances involved him detecting tiny unconscious movements (known as ideomotor actions) made by the spectator.

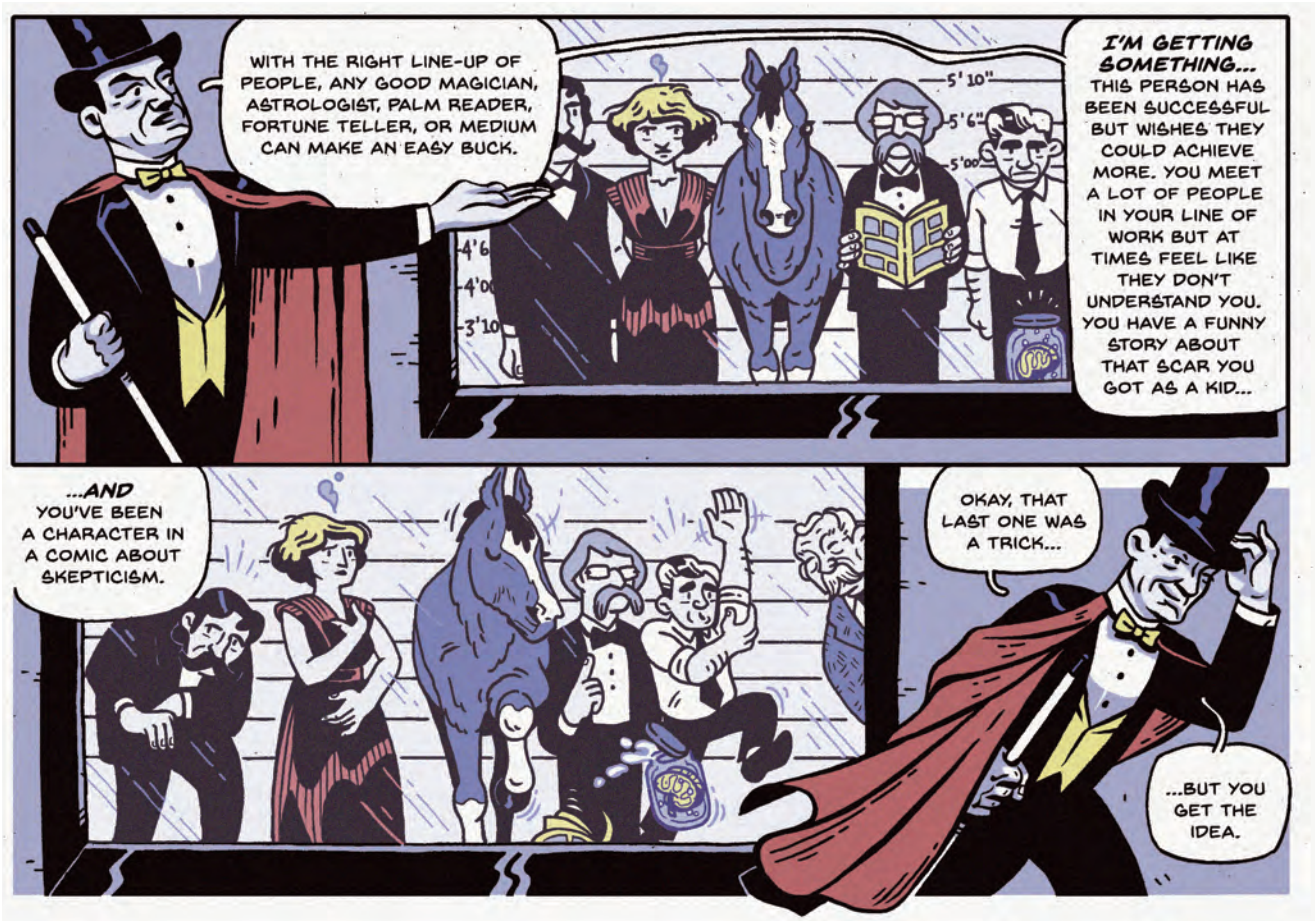
Another story focuses on the pioneer of parapsychology, Joseph Banks Rhine. Readers discover how Rhine was convinced that the results of his research supported the existence of extrasensory perception (ESP), but that skeptics have argued that Rhine's experiments were often poorly designed. The third and final story concerns a 1920s conman and conjurer named Alexander. Billed enigmatically as "The Man Who Knows," Alexander stood onstage and appeared to be

Research shows that both watching and performing magic tricks can boost curiosity and engagement.

BE AMAZED AS HE FINDS THAT WHICH WAS SECRETLY HIDDEN!
MR BROWN, YOUR HAT PIN IS HERE IN DOODLE'S BOW.
BORK-BORK!
MARVEL AS HE READS MINDS, KNOWING THE UNKNOWABLE!
MISS, IF YOU WOULD BE SO KIND AS TO SELECT ANOTHER NAME FROM THE DIRECTORY....
...THIS TIME AVOIDING "SMITH". THAT SOMEWHAT TAKES AWAY THE CHALLENGE.
NO ITEM IS UNFINDABLE, NO LOCATION UNREACHABLE!
MR WILLIAMS, I DARE SAY THERE'S A HAIR IN YOUR SOUP!
SPLOOSH
IT MAY TAKE A LITTLE PRACTICE, BUT ONCE YOU'VE MASTERED THAT, YOU CAN TRY IT ON A LARGER SCALE. IF SOMEONE HIDES SOMETHING IN A ROOM, THEN YOU PUSH AND PULL YOUR SUBJECT JUST A LITTLE.
IF THERE'S NO RESISTANCE, THAT'S THE RIGHT WAY. JUST REMEMBER NOT TO PUSH TOO --
TONIGHT: MAGIC LIVE!
-- HARD.
GAH!
slapp
TONIGHT: MAGIC LIVE!

able to mysteriously divine the innermost secrets of audience members. In reality, Alexander had several ways of discovering the information, including incorporating secret listening devices into the mirrors in the theater restrooms! Once again, Alexander's story is brought to life in a colorful and dramatic way, and readers learn about the psychology used to fake psychic readings.

Research shows that both watching and performing magic tricks can boost curiosity and engagement (Wiseman and Watt 2018; Wiseman and Watt 2020). As a result, we are eager to make the comic as interactive as possible, and we have scattered tricks, illusions, and demonstrations throughout the


WITH THE RIGHT LINE-UP OF PEOPLE, ANY GOOD MAGICIAN, ASTROLOGIST, PALM READER, FORTUNE TELLER, OR MEDIUM CAN MAKE AN EASY BUCK.
5'10"
5'6"
5'00
4'6
4'00
3'10
I'M GETTING SOMETHING... THIS PERSON HAS BEEN SUCCESSFUL BUT WISHES THEY COULD ACHIEVE MORE. YOU MEET A LOT OF PEOPLE IN YOUR LINE OF WORK BUT AT TIMES FEEL LIKE THEY DON'T UNDERSTAND YOU. YOU HAVE A FUNNY STORY ABOUT THAT SCAR YOU GOT AS A KID...
...AND YOU'VE BEEN A CHARACTER IN A COMIC ABOUT SKEPTICISM.
OKAY, THAT LAST ONE WAS A TRICK...
...BUT YOU GET THE IDEA.

first issue of *Hocus Pocus*. For instance, readers are shown a simple way of detecting ideomotor actions, are invited to test Bishop's powers of deduction, receive a psychic reading from Alexander, and take part in an experiment conducted by Rhine. We have also produced a free downloadable booklet for those wishing to use the comic for teaching or to delve deeper into the topic. This booklet contains additional information about the stories and further explains the psychology and science behind the various phenomena.

We are not the first to produce a skeptical comic. In the late 1940s and 1950s, magician Bill Neff appeared in a series of comics exposing various psychic scams and techniques. For instance, in the comic *Ghost Breakers*, Neff debunks spirit table levitation, explains some mind reading stunts, and presents an optical illusion that gives the reader the impression of seeing a ghost. Similarly, in the comic *Racket Squad in Action*, Neff exposes several scams used by fake mediums and psychics to fleece unwitting sitters. Both of these comics proved highly popular, and we hope that *Hocus Pocus* will follow in Neff's footsteps.

Our comic was launched in early 2020 and has already been positively received, with one reviewer describing it as "an utterly magical read" and "one of the most inventive and gorgeous comics we have read this year."There are more issues on the way, and each will present a skeptical take on seemingly paranormal phenomena. Comics are very visual, highly immersive, and entertaining. As a result, they appeal to a wide range of ages and attract diverse audiences. In addition, several studies suggest that comics are an engaging way of communicating science and mathematics (Farinella 2018).

Comics are currently enjoying a huge surge in popularity, and we are now using this wonderful form of visual storytelling to encourage a skeptical stance toward the paranormal. The first issue of *Hocus Pocus* is available to download for free at www.hocuspocuscomic.com, and print copies are available there too. ■

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SO YOU HAVE A GHOST IN YOUR PHOTO

JOE NICKELL AND KENNY BIDDLE

Although science has never authenticated a single ghost, spirits of the dead have posed for elaborate studio portraits, strolled casually into mundane photographic scenes, and darted into the snapshots of hopeful ghost hunters—or so it seems. Initially, however, ghosts were reticent to appear before the camera.

Advent of Spirit Photography

The earliest practical photographs—daguerreotypes (process announced in 1839)—failed to record any ghosts. The same was true for the later images known as ambrotypes (from 1855), as well as their successors, the misnamed "tintypes" (patented in 1856). It was not until the advent of glass-plate negatives (about 1859), which made double imaging easy, that "ghosts" began seemingly to materialize in front of the camera.

It fell to Boston photographer William H. Mumler to discover the "extras" in his pictures. When he recycled his glass plates, he found that a faint image could remain if the glass had not been sufficiently cleaned, resulting in an additional dim face or figure in the next photograph. Because Spiritualism had begun to flourish in 1848 (after two schoolgirls claimed to receive messages from the ghost of a murdered peddler), Mumler shrewdly advertised himself as a "spirit photographer." Abraham Lincoln's widow was among his later clients, but Mumler was revealed a fake when some of his "spirits" were recognized as still-living Bostonians.

Nevertheless, spirit photography continued to flourish. Sometimes the photographers produced such heavily draped and poorly focused figures that credulous clients could easily "recognize" the spirits as the loved ones they had hoped to see. Some sitters even helpfully brought pictures of the deceased to assist the photographer in tuning in to them in the Other World. Or he may even have taken the subject's picture before; in such instances, the resulting spirit would strike the same pose and wear the identical clothing of the available photograph (Nickell 1994, 146–149, 192–196). All sorts of *montage* techniques (a term loosely describing any process for making a single picture from two or more) were used, and there were numerous methods of creating fake spirit photos—twenty-two by one 1921 count (Nickell 1994, 146–155, 192–196).

Spirit photography took advantage of the gullible throughout the heyday of Spiritualism. However, it began to decline seriously during the first quarter of the twentieth century, especially after Harry Houdini (1874–1926) waged a protracted war on Spiritualistic fraud in general.

Ghost Photos

Meanwhile, whereas professional spirit photography used studio and darkroom deception, apparent ghosts could appear in photos taken by entirely honest folk. For example, suppose a photographer was creating a photo of the interior of a church. Because such an exposure would take a long time, the photographer would set his camera on a tripod, open the lens, and then perhaps go for a stroll. If someone happened to walk into the scene briefly and pause during this time, he or she might be recorded as an ethereal image, a "ghost."

With the advent of the roll-film camera, amateurs increasingly began to take snapshots, some of which contained anomalies that were mistaken for paranormal phenomena. Not surprisingly, just as spirit photography had awaited the invention of glass-plate negatives that made double exposures possible, some later types of "ghost" anomalies began to show up only following certain developments in cameras, as we shall see presently.

Typical of ghost photographs that became widely published is one taken of the so-called "Brown Lady" of Raynham Hall in Norfolk, England, in 1936. It was made by two magazine photographers who claimed they glimpsed the figure on the stairs just in time to make a quick exposure. Although it is reported that photography experts could find no trickery in the original picture, there is a sequel to the affair: More thorough analysis revealed the photograph was a fake, created by superimposing one image over another (Cohen 1984, 87–90; Fairley and Welfare 1987, 140–141).

An innocent example occurred at the "haunted" Mackenzie House in Toronto in 1968, when ghost hunter Susy Smith visited the site with two "warlocks." She managed to obtain a spooky picture showing one of the mystics with his fingers extended over an antique piano's keyboard. There appears in the area of his hands "a mysterious kind of mist." In fact, the "mist" was not there at all; the effect in the photo was caused by the white pages of music bouncing back her flash (from what we would now regard as an old-fashioned camera), thus

Figure 1. Droplets of moisture—i.e., rain—appear as "orbs" when reflecting the camera flash.

Figure 2. A braided strap can create the look of a "spiraling vortex of spirit energy" when it accidently falls in front of the lens and flash.

Figure 3. Several points of light become lines of light due to a long exposure and movement of the camera.

Figure 4. A face reflected in a randomly placed sheet of glass.

washing out (overexposing) a portion of the picture. (As confirmation that a flash was used, there are dark shadows in the photo and bright glare on the polished wood; see Nickell 2012, 159).

Today's Snapshots

Most of today's "ghost" images are produced by modern filmless or digital cameras that had become common by the mid-1990s. These compact cameras have increasingly been replaced by smartphones, which behave similarly.

Examples of such images are the bright discs known as "ghost orbs" that commonly appear in snapshots. Many of today's ghost hunters believe they are evidence of the paranormal. In fact, however, the camera's built-in flash simply rebounds from floating specks of dust, droplets of moisture, flakes of snow, or the like that are close to the lens. They, being out of focus, show up as round, radiant "orbs" in the resulting photos. This phenomenon was well understood by the 1980s (Mosbleck 1988, 208) when it was attributed to "spirit energy" (Nickell 1994, 159). Today the effect is easily produced experimentally (Biddle 2007, 5–20). (See Figure 1.) Any bright light source directed at the camera can also cause orb-like effects known as lens flares. For more, see Biddle 2007, 15–7.

Then there is the variety of effects caused by the flash rebounding from the camera's own wrist strap. This can produce a bright, white strand (with variations depending on whether the strap is flat, smooth, etc.). A *braided* strap can create the look of a "spiraling vortex of spirit energy" (Figure 2). Camera-strap "ghosts" are ubiquitous in photos, as are those caused by other common intruders such as strands of hair or jewelry—even flying insects, a wandering fingertip, or any of various other possibilities (Nickell 2012, 128–129, 272; Biddle 2007, 21–28).

Still another effect caused by the rebounding flash is that of a strange mist—sometimes called an "ectoplasmic mist," after ectoplasm, an imagined spirit substance. The mist typically turns out to be flash-lighted cigarette smoke, someone's frosty breath, or an incoming fog (Biddle 2007, 39–42).

Another phenomenon consists of puzzling light streaks, appearing in a (usually) nighttime photo as one or more lines of light. These lines may zigzag, form arabesques, appear in parallel, or do other stunts. The culprit is almost invariably a slow shutter speed, resulting in a picture that takes seconds rather than an instant to form. The person taking the photo snaps the shutter and—unaware the picture is still in progress—moves the camera. This causes *points* of light (such as a streetlamp) to become *lines* of light, forming mysterious, illuminated scribbles in the photograph (see Figure 3).

A major category of "ghost" images in photos is the *apparition*, of which there are different types. One is the *double exposure* (comparable to the early spirit photos), which can be made deliberately or may rarely occur accidentally. A *reflection* on glass is another way a transparent face or figure may be produced (Figure 4). Still another recalls an effect, mentioned earlier: given a long exposure with a digital

camera, someone could enter or leave the scene, creating an ethereal "extra" (Biddle 2007, 43–53). And there are other possibilities.

Then there is the effect known as *pareidolia*. That is a neurological-psychological phenomenon by which the brain interprets vague images as specific ones. It explains the ghostly faces and figures often perceived in photographs—in shadow patterns, foliage, and so on—like seeing pictures in clouds. Called *simulacra*, such images are especially looked for today in photos taken in supposedly haunted places (Nickell 2012, 351).

In addition to these accidental effects are various means of deliberately faking an image. They include "ghost apps" from smartphones and photoshopping techniques, as well as, no doubt, possibilities yet to be devised. Also, of course, an "accidental" effect may have been deliberate.

* * *

Such an overview as this cannot cover all possibilities of ghostly pictures, but—together with the accompanying chart (right)—should prove helpful as a first-look resource.

One should keep in mind the reason crime-scene and forensic photographs are admissible in court is because the conditions under which they have been made are known and can be attested to. With supposedly "paranormal" pictures, however, we may not know important aspects of their origin with any certainty. Therefore, such pictures are not really proof of anything. Certainly, the burden of proof as far as authentication is concerned is on the claimant—not on anyone else to prove a negative (i.e., that it is not a ghost). Asserting that a particular image must be paranormal because it is unexplained only constitutes an example of the logical fallacy called arguing from ignorance. One cannot draw a conclusion from a lack of knowledge. ■

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Joe Nickell is CSI's senior research fellow. He is author of *Camera Clues* (1994) and *The Science of Ghosts* (2012).

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Ghost Photograph Identification Chart

I. Ball of Light

A. Was it a shape such as a circle, hexagon, oval, or irregular shape?

1. Circle
   - a. Was camera flash used? *Most likely dust particles, bugs.*
   - b. Were there lights in the distance (porch lights, headlights)? *Most likely out-of-focus lights.*
   - c. Does the circle anomaly appear in the same location in multiple images? *Most likely water stain on lens or sensor.*
   - d. Are there reflective surfaces within the scene? *Most likely flash (or other light source) reflections.*
2. Hexagon
   - a. Was there a bright light source such as the sun, flashlight, streetlight, etc., in or just outside the frame? *Most likely lens flare.*
3. Oval
   - a. Was it raining or snowing? *Most likely raindrop or snowflake.*
   - b. Were you outside? *Possibly an insect in flight.*
   - c. Was there a bright light source within or just outside the frame? *Most likely lens flare.*
4. Irregular shape
   - a. Does the irregular shape appear in the same area on multiple images? *Most likely foreign object on camera lens or sensor (i.e., dust, fiber, hair).*
   - b. Was it moving across a surveillance camera screen? *Most likely bug on lens cover.* (See Figures 5 and 6.)

Figure 5. Lens flare caused by the sun in the top right corner.

Figure 6. Dust particles in an auditorium illuminated by a projector.

II. Streak of Light

A. Did the streak have a ribbed appearance (small humps)? *Most likely the camera strap.*

1. Flash off; *Black or gray in color (depends on color of strap).*
2. Flash on; *White in color (often overexposed).*

B. Did the streak have a smooth yet blurry look? *Possibly a strand of hair caught in flash.*

C. Did the streak look like a "band of energy"?

1. Check the exposure time of image. *Most likely motion blur/"camera shake" from a long exposure.*
2. Are there multiple bands that follow the same or similar pattern? *Most likely long exposure that caught multiple light sources in the scene.* (See Figures 7 and 8.)

Figure 7. A camera on a tripod, set to a long exposure, captures the path a flashlight travels across the scene.

Figure 8. A strand of long hair makes its way in front of the lens and flash.

III. Mists/Smokey Anomalies

A. Were you outdoors during cool or cold temperatures?

1. Was the camera near your face?
   a. Yes; *most likely frosty breath.*
   b. No; *most likely fog or natural mist.*

B. Was anyone smoking or vaping in the vicinity? *Most likely smoke or vapor from cigarette, cigar, vaporizers, and/or electronic cigarettes. Check for ashtrays.*

C. Was a campfire or torch in use? *Most likely smoke from the fire.*

D. Were you inside a cave, tunnel, or other similar underground area? *Most likely condensed moisture (mist).* (See Figures 9 and 10.)

Figure 9. Smoke from a cigarette just off camera.

Figure 10. Frosty breath floating in front of the camera, illuminated by the camera flash.

IV. Apparitional Figures

A. Faces

1. Are the features (eyes, nose, mouth, etc.) out of place and/or out of proportions? *Most likely pareidolia (apophenia).*
2. Are the facial features fuzzy while the body appears normal? *Most likely someone's head turned during a long exposure.*
3. Does the face appear on an interior wall? *Most likely a portrait, painting, etc., hanging on the wall.*
4. Does the face appear cartoonish or similar to drawings/paintings? *Most likely a digitally altered addition from a painting or drawing.*
5. Does the face appear on a multicolored and/or textured surface? *Most likely pareidolia (apophenia).*
6. Does the face lack color, appearing in black and white? *Most likely inserted by a ghost app from a smartphone.*

B. Shadow figures

1. Did the camera's flash fire?
   a. No; *most likely a long exposure (deepens faint shadows).*
   b. Yes;
      1. *Check settings and exposure time of image. Possibly a long exposure with flash (possible slow sync).*
      2. *Possibly a person caught beyond the effective range of the flash.*
2. Were other people in the area? *Most likely living person caught in the scene during long exposure.*
3. Does the figure appear on or against a wall? *Most likely someone's shadow (yours or another person's) in the path of flash or ambient light source.*

C. Transparent body/limb

1. Was the camera flash on?
   a. No; *most likely long exposure and movement of a person in the scene (motion blur).*
   b. Yes;
      1. *Check settings and exposure time of image. Possibly a long exposure with flash (possible slow sync).*
      2. *Possibly a person caught beyond the effective range of the flash.*
2. Does the "ghost" lack color (i.e., black and white, sepia tone)? *Most likely a "ghost app" on a smartphone.*
3. Are there parts of the "ghost" that are cut off sharply without any indication why? *Most likely phone "ghost app" or photoshopped image.* (See Figures 11 and 12.)

Figure 11. The face (of a statue in the house) was placed in the mirror via Photoshop.

Figure 12. "Ghost app" on a smartphone used to insert this "ghost" into a photo.

DISPENZA'S *BECOMING SUPERNATURAL*: HOW COMMON PEOPLE ARE BEING MISLED

Promises of attaining instant enlightenment and supernatural abilities made by many New Age gurus are misleading, insidious, and unscientific. Here's an examination of the claims made by Joe Dispenza in his book *Becoming Supernatural: How Common People Are Doing the Uncommon*.

CLARKE VAN STEENDEREN

Skeptical scrutiny is the means, in both science and religion, by which deep thoughts can be winnowed from deep nonsense.—Carl Sagan

I began reading *Becoming Supernatural* by Joe Dispenza[1] with an open mind. But I'm afraid that the more I read, the more critical I became of his references, interpretations of published work, experimental methods and findings at his workshops, choices of metaphor, blatant misuse of scientific terminology, statements of false "facts" that he writes about with such authority, and confusion of pseudoscience and hoaxes with legitimate scientific knowledge.

I initially wondered why anyone would publish this book and why people with medical degrees would praise it. Christiane Northrup, MD, writes, "This information is thrilling, life changing, and incredibly practical." Mona Lisa Schulz, MD, writes, "It is cutting edge and an amazing breakthrough in mind-body medicine." I wonder whether Mona Lisa wrote this with an enigmatic smile. In the book's foreword, Gregg Braden wrote that Dispenza drew information from "diverse fields of rock-solid science," and referred to the "scientific documentation from Joe's classroom discoveries" that "has the potential to change your life."

Hay House published this book in 2017. A paperback version was published in 2019. Hay House was founded by Louise Hay, author of several New Age books, including *You Can Heal Your Life*. If this individual (who had no medical degree—or any degree at all for that matter) could attribute ailments such as coughing, diabetes, ringworm, and kidney stones to "a desire to bark at the world," "longing for what might have been," "allowing others to get under your skin," and "lumps of undissolved anger," respectively, then my first question is answered without further ado.

Christiane Northrup is a well-known obstetrician-gynecologist in the United States who has a firm belief in astrology, tarot cards, past life regression therapy, and other mystical ideas that have not an iota of science behind them. Of course, one's personal ideas are of no consequence to anyone else, and one has every right to believe what one wants to, but it becomes a huge problem when these beliefs overstep a boundary from the personal to the professional and societal level. According to Northrup, "Research shows that past traumas—including traumas from past lives—… can be an underlying cause of chronic illness," "Many women have thyroid and other problems (like canker sores in their mouth) when they have something to say but don't dare say it," "Getting your child or yourself immunized is a culturally agreed-upon ritual, designed to shore up both aspects of first chakra-health"

(these last two quotes come from her book *Mother-Daughter Wisdom*, first published in 2005), and "Remember—vaccines and immunity are first chakra issues." Bear in mind of course that the concept of chakras has no scientific basis at all. My favorite one is her recommendation to women to direct *qi gong* energy to their vaginas to cure "all kinds of ailments." Well, if you ever happen to encounter a female suffering from vaginal atrophy or a yeast infection, you know what to recommend—although beware the consequences!

Mona Lisa Schulz is a psychiatrist and claims that she is a "medical intuitive that can detect health problems by intuition alone, which appears through clairvoyance." She makes these conclusions based on phone calls with clients, and, according to her, "I only know their name and age, and that helps me isolate intuition data. If they try to tell me about their health, I cut them off because it confuses me." This appeared on the Discovery Channel program *One Step Beyond*.

My last critique before finally plunging into the book regards Gregg Braden. Without going into too much detail, Braden has made claims of cancer being cured within three minutes (has he won a Nobel Prize yet?), that there would be a "magnetic reversal" of the earth's polarity in 2012 and that this can affect our DNA, and that collective prayer and thought would help clear the British Petroleum oil spill in the Gulf of Mexico in 2010.

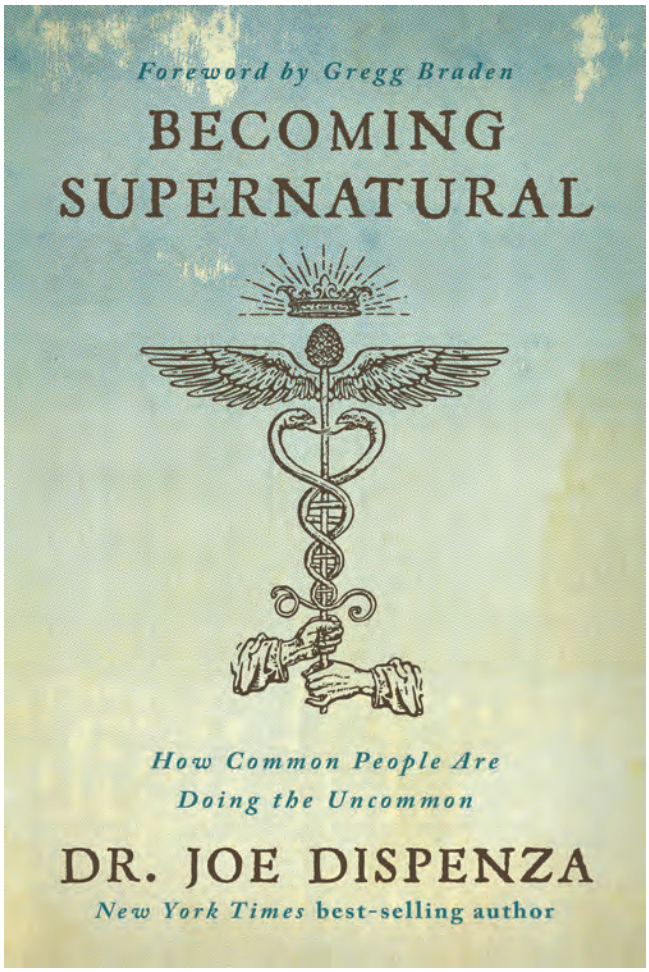
There is a common thread running through this commercialized New Age movement, where several opportunists publish with the same company, recommend each other, and conveniently dodge the bullets that mainstream science and peer-reviewed journals will fire at them. So, let's load the magazine of logic and reason, and fire away.

In the first chapter, the author describes a mystical experience he had during one of his meditation sessions, which sounds very much like the effects of hallucinogenic drugs: "All my senses were heightened 100 percent. Everything I saw, touched, felt, smelled, tasted, and heard was amplified." Dispenza describes being a "stout man in a very hot region of the world … I was a philosopher and a longtime student of some charismatic movement … on a pilgrimage and mission of sorts." In my understanding of this narrative, he believes himself to be a prophet and bearer of some valuable new information to humanity. Almost comparing himself to Jesus Christ, he notes, "I had just finished addressing a crowd in a relatively populated village. The gathering was just breaking up when suddenly, several men quickly moved through the masses to arrest me." My point is this: How can we take someone seriously whose motivation to help people through meditation was sparked by a narcissistic hallucination? For one thing, I don't recall Jesus charging entrance fees to his speaking events.

In the second chapter, Dispenza cites a study by Pascual-Leone et al. (1995). His interpretation of the subjects in this study was that "if you were to put them in front of a piano after five days of mental rehearsal, many of them would be able to play the exercise they imagined pretty well, even though they had never before tickled the ivories." This leads the reader to believe that mental rehearsals can replace physical actions and practice. The original study concluded that "mental rehearsal alone … was significantly less than that produced by physical practices alone" and that "mental practice alone seems to be sufficient during the early stages of motor skill learning," and "the combination of mental and physical practice leads to greater performance."

Page 58 mentions the use of a "gas discharge visualization" (GDV) machine with a "Sputnik antenna" and that Dispenza and his team measured the changes in "ambient" electromagnetic energy in the venue rooms emitted by his students over the duration of his workshops. Taking measurements with a GDV machine is just a fancy way of performing Kirlian photography. Although the corona plasma discharge is an interesting interaction between high voltage and moisture, its use in showing "auras" or other measures of mystical energies is pure pseudoscience. It also has no practical applications, apart from producing pretty images. Dispenza and his team were measuring nothing more than changes in moisture in their workshop rooms. Perhaps they need more ventilation in their venues. Or maybe his participants were just a little on the sweaty side.

Apart from the airy-fairy talk about brain changes in the quantum field and coherent and incoherent brain waves, what caught my attention in chapter three on page 73 was Dispenza's reference to a study by René Peoc'h (1995) involving


Foreword by Gregg Braden
BECOMING SUPERNATURAL
How Common People Are Doing the Uncommon
DR. JOE DISPENZA
New York Times best-selling author

chicks and the behavior of a robot. This was the first time I had heard of the *Journal of Scientific Exploration*. Its impact factor for 2018 was 0.09, and it is known for its association with "fringe science," including phenomena such as ESP, dowsing, cryptozoology, reincarnation, and UFOlogy. Henry Bauer, the previous editor-in-chief of the magazine, is an AIDS denialist and believes that the Loch Ness monster exists (he even wrote a book on the matter, *The Enigma of Loch Ness: Making Sense of a Mystery*, published in 1986). If someone such as Dispenza wishes to make a solid argument backed by science, why resort to citing articles in this low-ranking journal with a questionable reputation?

On page 80, Dispenza writes, "Some of our students have lowered their cholesterol levels just by tuning in to a potential. They've lowered their cancer markers. They've made tumors disappear." Yes, and "extraordinary claims require extraordinary evidence." And where is the evidence for these grand claims? Can we see before-and-after scans? X-rays? Blood test results? Who are "our students"? Who were the doctors involved, and can they give testimony? Can we transcend the first-name basis and get more information other than "Anna's Turning Point," "Ginny Heals Her Chronic Back and Leg Pain," "Donna Helps Souls Cross Over," and "Jerry Returns from the Brink of Death"?

Dispenza mentions on page 89 in chapter four the work of Fritz-Albert Popp, the discoverer of biophotons (see Popp et al. 1988). It has indeed been shown that biophotons are emitted by biological tissues, but whether these photons play a role in intercellular communication is not certain. Knowing that this theory is not at present accepted in mainstream science, Dispenza still writes: "the more intense and coherent the light field, the greater communication between cells and the healthier the organism" and "it's not molecules and positive or negative charges that are instructing the cell to do what it does … it's the biophotons … and their patterns of light and frequency that the cell emits and receives that give the instructions." He seems to have mixed up biophotons with the nucleus! His mention of organ transplants and cellular memory also does not belong in a book praised for its "rock-solid science."

The comparison of the human body to a magnet with a north and south pole sounds ridiculous, but to me, one of the two worst blunders in this book (the second will come later in chapter 12), is the statement on page 125 in chapter five that "at the same time you inhale, the sutures of your skull open up just slightly, and as you exhale, they close back up." Read that statement again if it makes sense to you. This apparently "propagates the cerebrospinal fluid up your spine all the way to your brain." He cites M.B. DeJarnette in an article titled "Cornerstone" in *The American Chiropractor* written in 1982. I could not find or access this anywhere online. If anyone else can, please let me know, because I would love to know where this nonsense came from. Dispenza writes on page 137 that he measured gene expression in thirty participants before and after his workshop. He cites his own presentation for this finding and says that it has been "submitted for publication." I could not find this anywhere either. Where was it submitted? Can we see the data and the methods used? How did he account for biological variability in these subjects? Is thirty people a large enough sample size to be making these claims? Or is this being reviewed by the same guy who is still out searching for the Loch Ness monster and Bigfoot in the hills yonder?

On page 155 in chapter seven, Dispenza writes that the Mesopotamians "performed human sacrifices whereby they extracted a still-beating human heart to offer it to the Sun God" (funny, I thought that it was the Aztecs and Mayans who didn't have a heart). Dispenza also states that "at the turn of the 20th century, hardly anyone died of heart disease." It has been found that heart diseases such as atherosclerosis were much more common in premodern humans than previously realized (see Thompson et al. 2013, for example).

Page 156 introduces the HeartMath Institute (HMI), which produces "pioneering, groundbreaking work" regarding "heart-brain coherence." Although their mission statement is positive and they are aimed at helping people, I am very skeptical about the terminology they use. The term *heart-brain* is extrapolated to imply that the heart has a "mind of its own" because it possesses some 40,000 neurons. The gut has over 100 million neurons, so this is a weak, misleading argument; neurons alone do not equate to mind or consciousness. The HeartMath Institute was founded by "Doc" Childre, who does not hold a degree and whose research is directed by Rollin McCraty—who, not surprisingly, is a member of the Society for Scientific Exploration. Apart from the absence of peer-reviewed publications by Dispenza himself, HMI appears to have most of their publications published in journals with low impact factors and directly through university departments. These are red flags and should not be taken lightly for an organization approaching the health sector and charging money for their services.

Page 161 states that "Today, with about 75% accuracy, science can predict what someone is feeling just by looking at the beat-to-beat activity of the heart using heart rate variability analysis." By "science today," he is referring to his own "advanced workshop with Joe Dispenza." Page 166 makes reference to Gary Schwartz and his experiments regarding heart-brain coherence, where he "found inexplicable communications between the heart and the brain that made no sense via neurological or other established communication pathways." This is the same guy who reported that Reiki had an effect on lab-cultured bacteria, that the human mind can change the pH of water over long distances, and that "pollution is not simply chemical, it is ultimately energy based and therefore conscious as well" (see his book *The Energy Healing Experiments: Science Reveals Our Natural Power to Heal*, published in 2007). The Skeptical Inquirer has published several devastating critiques of Schwartz's work over the years by Ray Hyman (2003a; 2003b) and Richard Wiseman (O'Keefe and Wiseman 2001), among others.

Page 200 in chapter eight refers to brain scans taken while a participant was reviewing their "Mind Movie." Can we see

comparative scans while the participant is performing another task? What is this one image supposed to prove? Dispenza loves mentioning his "advanced workshops," his "students," and his URL address where you can purchase his goods. Why the need for all this commercialization when you're dealing with people who are broken, depressed, sick, and searching for self-betterment?

On page 222, Dispenza states that "And as you know, the majority of people's personality is based on past experience." Modern science is pointing toward our genes shaping our personalities to a much larger degree than previously thought. See, for example, Flint and Willis-Owen (2010). I also find the jump from Newtonian physics to the complexities of human behavior and psychology a long shot. This chapter, in my opinion, is a prime example of the misuse of the field of quantum physics to support pseudoscientific claims made by people with a poor understanding of its concepts.

Chapter twelve is probably the most embarrassing one in the book. Dispenza promotes the idea that microscopic crystals in the pineal gland create a "pulsating electromagnetic field" via the piezoelectric effect upon inhalation and exhalation. This then becomes a "pulsating antenna" that is further stimulated by cerebrospinal fluid "tickling" the cilia in the pineal gland. This overstimulation results in the "phallus-shaped gland … ejaculating upgraded metabolites of melatonin … leading to a transcendental experience." That certainly escalated quickly! According to Kenneth Saladin, a professor of parasitology, "there are crystals that develop within the pineal gland with age, and develop in some other parts of the brain too, called 'corpora arenacea' or 'brain sand' … They are entirely harmless … There is a lot of pseudoscience and medical quackery going around about these pineal granules" (Saladin 2017).

The *coup de grâce* of this chapter begins on page 282. Dispenza shows an image of a crop circle in the shape of the melatonin molecule and writes "Is this crop circle [appearing in 2011 in Wiltshire, England] an elaborate hoax? Or is somebody somewhere in another dimension trying to tell us something?" Crop circles were debunked decades ago, in Skeptical Inquirer and other publications. The only thing that the pranksters Doug Bower and Dave Chorley showed the world with their crop circle art was the extent of the gullibility and superstition displayed by human beings.

Never mind Dispenza's comparison of a cross-section of the brain to the Egyptian eye of Horus, his use of the Fibonacci constant to highlight the importance of the pineal gland, or his allusion to the staff of Hermes from Greek mythology to the movement of energy up the spine. He refers to a YouTube video by David Wilcock (a name he misspells as Wilcox), titled "Understanding the Sacred Geometry & the Pineal Gland Consciousness." Wilcock believes that he is the reincarnation of the psychic Edgar Cayce, has spoken about the "2012 enigma" at the "Truth Convention," and argues that "the fantastic powers of deities and heroes in the world's ancient mythologies should be interpreted literally as evidence of lost alien technology."

Conclusion

Dispenza's previous affiliation with the Ramtha's School of Enlightenment (RSE) is deplorable to say the least. RSE was founded in 1988 by Judy Zebra Knight, who claimed to channel the spirit of "Ramtha," a 35,000-year-old being who first appeared to her in her kitchen while she balanced a toy pyramid on her head to signal to him. This being has taught her everything from "theology to quantum physics." Anyone involved with a group such as this should not be revered as a role model—let alone make money from authoring self-help books.

If Dispenza did not attempt to use science to back his claims, it would be more challenging to criticize his writing. One cannot claim that someone else's personal experiences are false. But turning the mystical and the world of pseudoscience into a lucrative business is nothing more than preying on the vulnerable and lonely people in the world. Highfalutin claims about self-healing can quickly become insidious, and *Becoming Supernatural* is nothing more than the regurgitation of age-old ideas mixed with cliché pseudoscience packaged as an expensive book and series of workshops marketed to the gullible public. ■

Note

1. *Becoming Supernatural: How Common People Are Doing the Uncommon*. By Dr. Joe Dispenza. Hay House, 2017/2019. Paperback, $20.

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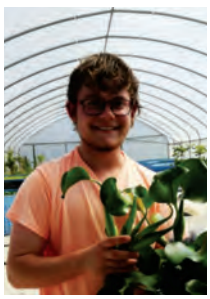

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Creationist Funhouse, Episode Four

GOD PLAYS IN THE MUD

Conservative creationists believe God made a young, created universe appear to be an old, evolved one. In this episode, we see that they believe that God, in the middle of the flood of Noah, smooshed the mud around so that it looked as if it were deposited over the course of millions of years instead of all at once.

STANLEY RICE

This is the fourth of an occasional series of articles on the Creationist Funhouse.

James Hutton was a scientist in the eighteenth century, back before there were professional scientists. But he had the single most important trait that a scientist needs to have: he had the habit of asking questions about the things that he saw.

As he walked along the cliffs near Edinburgh, Scotland, he saw a promontory that thousands of people had seen for thousands of years and that he also had seen many times, but this time he started asking questions about it. What he saw was an *unconformity*—that is, a place where the layers of sedimentary rock above the unconformity did not match those below. You don't have to go to Edinburgh to see a geological unconformity (although you could always use that as an excuse for a European vacation). You can see some right here in America. I have never been to Scotland, so I will tell you about the Great Unconformity in the Black Hills of South Dakota, which I have visited.

The Great Unconformity is a line that separates Precambrian rock layers, which are in this case over two billion years old, from Cambrian rock layers, which are about a half-billion years old. Of course, that is according to an evolutionary interpretation. To a creationist, this unconformity, like all sedimentary rock layers, was formed during the flood described in Genesis 6.

The standard scientific explanation of the Great Unconformity in the Black Hills is that the lower layers formed in a shallow sea and were compressed into sedimentary rock. Then, after they were rock, geological forces lifted them above sea level and tilted them. This process took a long time, and a lot of erosion occurred. Almost two billion years later, the land subsided, or the sea levels rose (or both), the tilted rock layers were again submerged, and new sediments accumulated in layers on top of them. Finally, the whole thing was compressed into rock and raised up into the mountains, where you find them today.

The Great Unconformity, part of which is in the Black Hills of South Dakota, could not have formed during a Flood.

Here is why the unconformity could not have formed during a single flood. The rock layers below the unconformity have been tilted, and the upper layers laid down horizontally on top of them. If this all happened during a single flood, the lower layers (still being mud) would have been compressed into a big muddy pile—that is, unless something turned those

mud layers to rock *before* they were uplifted and tilted. But how could mud layers turn into rock in the middle of a flood? Well, interesting that you should ask that question. Because God can do anything he wants. He obviously scooched the sediments around and squished them into rock even as the flood waters raged all around him. God, you're my hero! Your valiant efforts have once again made a young earth look old.

Some creationists claim that the sedimentary layers below the unconformity formed during the two thousand years before the flood. But this does not help their case very much. Even two thousand years is not enough time to produce, solidify, and tilt all the sedimentary layers below the unconformity unless God did it miraculously—something the Bible does not mention. In fact, Genesis makes the pre-flood world sound like a quiet place in which gentle mists dominated the water cycle.

Genesis makes the pre-flood world sound like a quiet place in which gentle mists dominated the water cycle.

Creationists believe that during the flood, God was very busy thinking about the human future of the earth. In particular, God was getting the earth ready for its industrial future by making sure that the crust of the earth contained massive deposits of coal and oil. Once again, God had us modern people in mind during ancient times by creating things of which all the people who lived before us were unaware.

Coal formed mostly from leaves and branches of ancient forest trees. Oil formed mostly from single-celled photosynthetic cells that floated in ancient shallow seas. Most creationists believe that all the coal and oil formed from trees and cells that were alive at the same time, on the day that Noah entered the Ark. Calculations quickly show that the earth could not have contained this much biological material all at one time—unless, that is, the pre-flood earth had more land area and the growing conditions were better than any found on the earth today. One creationist wrote that it would take only a 128-fold enhancement of plant productivity over that of modern levels to account for the coal and oil. Another creationist claimed that God created the oil miraculously.

But God wasn't finished yet! He knew that modern industry would need supplies of mineral ore. So, as the flood deposited sediments, God made sure that many of these sediments contained such abundant minerals as iron and aluminum but also rare minerals such as cadmium and germanium. Had these minerals been dispersed among all the sediments, modern mining technology could not have profitably extracted them. God made sure there were concentrated deposits of ores of everything from iron to germanium. And the best is yet to come for modern industry to make use of God's mineral blessings. The mountains of Afghanistan, where American troops are conveniently located, contain vast deposits of rare minerals that are necessary for electronic equipment.

The small formation in Idaho is world famous because between the layers of shale (and layers of volcanic ash), you can find many perfect leaves.

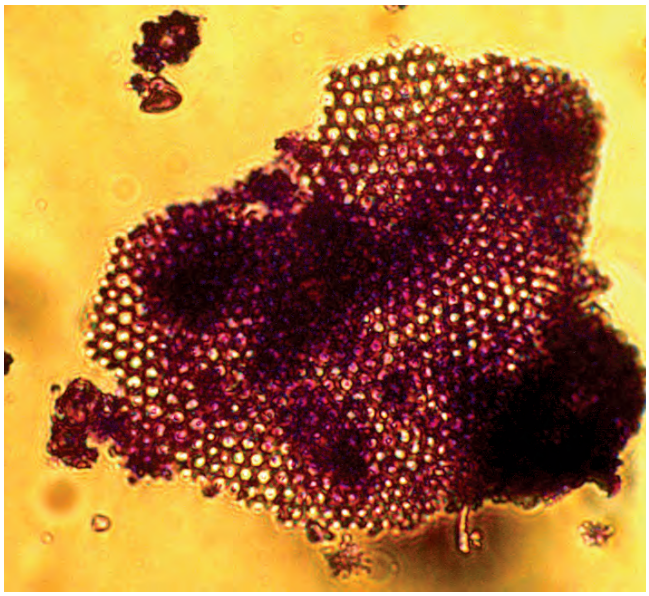
The Bible, of course, says nothing about God manipulating the flood to produce coal, oil, or mineral deposits.

Creationist calculations about how much vegetation would be needed to account for coal and oil assume that all the biomass was buried in flood sediments. This could not have occurred. A lot of the biomass (mostly plants) would have floated and ended up on the surface of the massive piles of sediment and mud that Noah would have seen all around him when the waters receded. If even half of the biomass ended up rotting on the surface, the resulting carbon dioxide gas would have caused, by my calculations, at least 10° C of warming over previous levels. This is not enough to make the oceans boil or Noah's family fall over dead but certainly enough to notice.

Credit: Loraine Thompson

And then there are the microbial deposits other than oil. In some cases, whole mountains consist today of what used to be microbes. One example is organic limestone, which formed mostly from calcium carbonate bio-ooze. Far from being flood deposits, these limestone deposits often contain very little rock, sand, silt, and clay.

One of the most breathtaking examples of a purely biological deposit is one that is built of single-celled algae known as diatoms. Today, diatoms are abundant in shallow water, where billions of them die and form layers of white ooze at the bottom. Diatom shells consist of silicon dioxide rather than limestone carbonate. Just uphill from Lompoc, California, a little



A microscopic view of a diatom shell from the Purisima Hills deposit.

The Purisima Hills of California's central coast consist almost entirely of diatoms that accumulated at the bottom of a shallow sea.

east of Vandenberg Air Force Base, there is the world's largest deposit of diatomite, also known as diatomaceous earth. This mineral, remarkable for its purity, consists almost exclusively of dead diatoms. Between about five million and about one million years ago along the coast of California, trillions upon trillions of diatoms lived in shallow tranquil water (not flood water), then died and sank to the bottom, forming vast layers of diatomaceous slime that were later compressed into diatomite, which now forms entire hills. You can still see fragments of diatom shell under the microscope when you examine diatomite. The White Cliffs of Dover are a similar deposit, consisting of coccoliths rather than diatoms. Thick accumulations of coccoliths have produced all the other chalk deposits in the world as well.

The Fossil Bowl deposit in Idaho contains hundreds of preserved leaves.

While violent flood waters sloshed around, autumn leaves quietly accumulated in a pond in what is now Idaho. About fifty miles south of Coeur d'Alene, Idaho, there is a dirt racetrack called Fossil Bowl. Back away from the racetrack is a little cliff of shale layers, about the size of a three-car garage. This small formation is world famous because between the layers of shale (and layers of volcanic ash), you can find many perfect leaves. The volcanic ash allows scientists to estimate the age of the deposit as about fifteen million years. The leaves are not, strictly speaking, fossils. In a true fossil, the original organic material has been largely or completely replaced by minerals such as quartz. But these leaves still consist of organic material. Some of the leaves, when first exposed to the air, still have the same reddish color that they had when they fell off the trees during an autumn day fifteen million years ago. Minutes after exposure to the air, the organic material carbonizes, as in the photo above. The leaves fell from the trees and were compressed into anaerobic sediments; you can still smell the anaerobic sulfur. This could not have happened during a big, raging worldwide flood.

First, consider what kinds of leaves are in this deposit. They are not a random collection of leaves as one might expect from floating rafts of flood vegetation. They are leaves from a beech forest similar to those found in China or the eastern United States today. The leaves are beech, sycamore,

sweetgum, oak, and other deciduous tree species, including bald cypress, a deciduous conifer. The leaves came from a forest that was growing in that location fifteen million years ago.

There are no such forests in Idaho today. All around the site today are forests of Douglas fir and pine. Fifteen million years ago this location was at low elevation, a wet forest; today it is at high elevation and much drier. The reason for both changes is that the western mountains of North America have been pushed up by volcanic forces. This accounts for the higher elevation. These new mountains create a rain shadow that blocks most of the Pacific moisture from reaching the dry forests. This accounts for the drier conditions. These were also the mountains that produced the volcanic ash from which a radiometric date could be obtained. These volcanoes still erupt, most recently Mt. St. Helens in 1980.

A second interesting thing about these leaves is that they came from trees similar to, *but not quite the same as*, modern deciduous trees. The leaves were recognizable as beeches, sycamores, and sweetgums but came from no existing *species* of beech, sycamore, or sweetgum. There has been just enough evolution in fifteen million years to produce slightly different species of each kind of tree.

At Ashfall Beds in Nebraska, hundreds of mammals were entombed in volcanic dust, not flood sediments.

How selective God must have been to find just the leaves that would be similar to but not quite the same as those of a modern deciduous forest and then bury them gently in volcanic ash that he had made to appear fifteen million years old in a pond in Idaho during the flood.

Oh, but God was even busier than this. To see evidence of his consummate skill, all you have to do is to visit Ashfall Beds State Park in Nebraska. Though seldom visited by people from great distances away, this little park is one of the most astonishing places you could go if you want to learn about the history of the earth. In a single location, you can see scores of animal skeletons—mostly rhinoceroses, camels, and three-toed horses—all piled up together. With their bones still in place!

There has been just enough evolution in fifteen million years to produce slightly different species of each kind of tree.

Superficially, the Ashfall Beds deposits look like the remains of a flood, of The Flood. It looks like a lot of big animals got washed up into a pile by a flood, where they got buried by sediments and decomposed quietly without their bones being disturbed. But there are numerous reasons this could not have occurred.

First, the bones are embedded in volcanic ash, not in sediments. The animals died when a volcano erupted and the ash suffocated them. These bones are not a water deposit.

Second, all the bones are from animals that lived at the same place at the same time, in a prairie about twelve million years ago in what is now Nebraska. There are no bones from any place else. Not a single dinosaur, as they had become extinct about fifty million years earlier. Not a single aquatic animal. The only animals entombed here are the species known from other deposits of similar age from North America.

Twelve million years ago, rhinoceroses, camels, and three-toed horses lived in North America. Since that time, American rhinoceroses and camels have become extinct, and modern horses, with a single toe (the hoof), have evolved. And these animals all came together at a small waterhole because, having breathed the volcanic dust, they became very thirsty. The water they drank did them no good. They died from breathing the dust, which then silently covered them. They are still there. This was not a flood.

Geological unconformities in what is now Scotland and South Dakota are evidence that the landscape of earth was not produced by a giant flood—at least, not without a lot of help from God playing in the mud. So, also, are the deposits that occurred in shallow ponds or in volcanic dust in what is now Idaho and Nebraska and the deposits in California and England. But while God was busy pushing dirt around and creating little fossil ponds and big piles of dead algae, he was also devilishly planting evidence that we today would interpret as evolution. That is the topic of our next episode. ■

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IS CHEMISTRY A FORCE FOR GOOD OR EVIL?

There is much misinformation about chemicals, which have been both glorified and demonized. Here's a closer look at the benefits and harms of chemicals.

PETER R. LANTOS

What is it you think of when someone says "chemicals" or "chemistry"? Do you shout "yeah!" or do you react the way some of the news media do, where you seldom encounter the word *chemicals* without the adjective *toxic*? As a result, many people have expressed the opinion that all chemicals should be banned. I wonder how many readers would favor that?

There is justification for concern regarding chemicals because there have been many times when they posed problems. One event that comes to mind is the disaster at Bhopal in India, the worst ever industrial disaster: a pesticide plant malfunctioned, and there were massive emissions of methyl isocyanate and other gases. Estimates range upward to 8,000 dead and half a million people injured.

There has also been the issue of fluorocarbons, which are used as propellants in aerosols and as plastic foaming agents. They are responsible for a depletion of the ozone layer, the part of the atmosphere that helps protect against the ultraviolet radiation that causes skin cancer, cataracts, and other health issues. Or to get closer to home, consider landfills where plastics packaging, designed to be durable, proves to be durable also in the landfill and adds to the massive amount of waste there and in the oceans.

To get personal, my twenty-something daughter was gardening and spreading Dursban, an organophosphate insecticide. She was taking all the prescribed precautions, including wearing protective gloves, but soon experienced severe body tremors that persisted for months.

Another example: The use of MTBE as a gasoline additive has the beneficial effect of producing a cleaner-burning gasoline, but it creates a problem. Gasoline tanks are not leak proof, and the MTBE, a water-soluble material, found its way into the water system. It was not a satisfactory approach for ensuring a cleaner-burning gasoline.

DDT was a wonderful insecticide that helped create sanitary conditions for control of typhus and malaria, diseases spread by animals. But it eventually proved to be an environmental hazard, including causing damage to wildlife, especially birds, which outweighed its beneficial effects.

So, we see that chemistry has resulted over the years in several problem situations. But let us look at the other side of the coin.

Perhaps the most obvious benefit of chemistry has been the development of medicines. Not long ago there were few remedies for allergies, diabetes, depression, osteoarthritis, high blood pressure, or high cholesterol. Modern medicine, through appropriate chemicals, is helping us treat these as well as numerous other ailments and diseases. You might argue that these are the benefits of medicine, not chemistry. However, each of these medicines is a product of chemists who invented them, learned how to synthesize them, and made them available for the healthcare industry.

Surgery could not be carried out without anesthetics, although a long time ago it was performed that way; at best, the patient was given a stick on which to bite down and maybe a slug of whiskey to ease the pain. We later began to use chloroform, which itself proved to be a health hazard, followed by the use of ether which was effective—but was an explosion hazard. Today we have safe and effective anesthetic systems to help get a patient through serious procedures.

But let us leave this most obvious example. Let's take the case of the automobile, one of America's favorite toys. It was not so long ago that if I looked at a four-year-old car, I would see the chrome decoration (bumper, handles, grille work) badly peeling; the paint was cracking and checking in numerous places; there were rust spots on the body where the panels had rusted through; the radiator had probably been replaced at least once; the interior of the car smelled musty; and the seat was dirty.

That was then. Chemistry has brought about some major changes. Improved pickling and chrome-plating technology result in durable chrome-plated components. The paint is improved so that a four-year-old car is just as bright and shiny as it was when new, even without waxing. Undercoating chemicals and metal treatments protect the car's body panels. I do not recall seeing a rusted-out car body in a long time. Antifreeze, which would decompose after just a year or two and result in a corroded radiator, is now stabilized, and you do not have to change the coolant. The upholstery and interior panels are no longer made of cotton, which when repeatedly wet acquires a musty, moldy odor. Instead they are made either from synthetic fibers or from plastic materials, all of which are unaffected by water or dirt. And the urethane foam makes the seats much more comfortable than did the horsehair stuffing.

There is another part of the car that has improved thanks to chemistry: the tire. Tire life used to be about 25,000 miles, and you would be careful not to drive over broken glass for fear of fatally cutting the tire. Thanks to chemistry, we now have tires that easily go past 50,000 miles, are much safer, resist damage, and can perform superbly even under the demanding conditions encountered on our high-speed interstate highways.

Consider the fuel for cars. Engines with high compression ratio require high-octane fuel, which used to be made by adding tetraethyl lead to the gasoline. But eventually we realized that the lead in this additive is a major environmental hazard. What came to the rescue? Chemistry. Now, through innovations in refinery catalysis, petroleum can be refined to produce high-octane gasoline without requiring a lead additive.

While on the subject of lead, let's leave the car and look at the paint used in the home. Here again there used to be a health hazard: the lead that was present in many pigments as well as in some paint stabilizers. But chemistry has allowed us to make paints totally free of lead, so it is easy to comply with regulations aimed at eliminating lead from houses. An added bonus from chemistry: we now have waterborne paints instead of solvent-based ones, eliminating odors as well as enabling easy cleanup.

Also in the home, soiled fabrics and carpeting are readily cleaned because they are treated with soil repellents. I recall a rather expensive couch my family had. Even though kids were allowed to camp on it only infrequently, after just two years it was badly soiled, and the fabric had pilled and was shabby. Today's upholstery fabrics benefit from fade-resistant dyes and soil and water repellents, and the fabrics made from synthetic fibers are durable and no longer pill.

Let's turn to the human element. Both women and men will appreciate modern cosmetics—the lipstick, face powder, glosses, and UV screens that make people more attractive and feel better about themselves. And we do this with safe chemical ingredients.

Do we recall the days of doing the laundry with soap? If so, do we remember the dubious job soap did, not removing ring around the collar, in addition to forming scum? Do the modern detergents, used not only in laundry detergent but in dish soap and in shampoos, represent a significant advance? Do many of us enjoy the use of water that is no longer "hard" because of water-softening resins?

How about our clothes? I remember only too well when a raincoat allowed water to pass through it readily; when socks developed holes after just a few days of wear; when silk stockings were expensive and fragile; when trousers developed baggy knees; and you would not even think of wearing a laundered shirt or other garment that had not been ironed. All that has changed. Shirts, even those made from cotton, can be worn without ironing (if you are not too fussy) because the fabric has been treated with permanent-press resins. And the same water repellents and stain repellents mentioned earlier in connection with upholstery fabrics and carpeting are applied to garments with equally beneficial effect.

So, we have heard of serious problems caused by chemicals. You may have even heard the absurd suggestion that all chemicals should be banned. But is that possible? How about the rocks out there? They are made of chemicals: carbonates, silicates. The trees? They are cellulose, lignin, and chlorophyllin. Meat is nothing other than proteins and fats. The salt we put on our food, or spread on ice, is sodium chloride, and the air is nothing but a mixture of oxygen and nitrogen.

To take it to an extreme: our body is a conglomeration of chemicals ranging from proteins, fats, and keratin to a profusion of water. Let's face it: *chemicals are us!*

Some suggest that we should concentrate on using only chemicals that are "natural." Natural chemicals would include poisonous belladonna; mercury and heavy-metal pigments found in rocks; or even the flatulence of cows, methane, which contributes even more than we used to think to climate change.

So, here we are. You have now heard about a lot of problems and a lot of benefits that are the products of chemistry. Because literally every substance is a chemical, we can neither ban chemicals nor permit only the use of so-called natural chemicals. Most of the problems have been caused not by the chemicals but by their misuse or by human ignorance. ■

Peter Lantos is a retired chemical engineer. He has a PhD from Cornell University and spent thirty years in senior management positions at Du Pont, Celanese, Atlantic Richfield, and other places. After that he formed a management consulting firm, served for twenty-five years as its head, and was as an expert witness in twenty-four cases.

A PHYSICIST, A BIOLOGIST, AND A PSYCHOLOGIST WALK INTO A BAR

The Differing Appeals of Disbelief

Forms of religious skepticism among scientists vary from field to field. Here's why.

JEFFERSON M. FISH

"There are no atheists in foxholes."

This phrase purports to be an empirical statement. Despite the practical problems, one could in principle determine the percentage of nonbelievers in the infantry and interview them under fire—when a random event could end their life at any moment—to see how many abandon their skepticism and pray for divine intervention.

An important point, though, is that the statement has nothing to do with the existence of a god. It concerns the conditions under which people display belief in a deity. Turn this around and consider the obverse statement: "There are no theists in science." I would like to discuss some of the forms of religious skepticism one finds among scientists and consider the psychological appeal of—in contrast to the empirical evidence for—their disbelief.

Physicists

There have been studies comparing religious beliefs of academics in various disciplines with those of the general population. Around the world, there are country-to-country differences in the proportion of nonbelievers/skeptics. In general, scientists are several times more likely not to believe in a god than is the general public. Views vary among disciplines, though by substantially less than between them and the public. And often, physicists, biologists, and psychologists are high on the list of religious skeptics.

For physicists, one emotionally persuasive argument must be the incredible size of the universe—with estimates that keep expanding along with improvements in our ability to observe. A current ballpark estimate is that there are two trillion galaxies, averaging 100 billion stars each, and you may if you like multiply that by some number to estimate the even larger number of planets.

The notion that we are somehow special, on this little speck of a planet, in this particular galaxy, at this particular moment in the 13.8 billion-year history of the universe, strains credulity for many physicists. Furthermore, after about a billion years, the universe began to appear more or less the way it does now. Everywhere in the universe's vastness that astronomers look, the same laws of physics seem to hold true. Thus, the false assertion that the universe is only a few thousand years old seems preposterous, as does the belief that during the prescientific eras on our planet—when key religious texts were written—miracles inconsistent with the laws of physics occurred.

Mathematicians

Mathematicians, like other highly educated people, are less likely to believe in a god than is the general public. But interestingly, they are more likely to believe in a god—or to be open to ideas about divinity—than physicists and other scientists. As a teenager, I planned on becoming a mathematician. And while I sometimes feel as if I have forgotten more math than I ever knew, I do remember the high school moment when, in a college math class, the teacher manipulated an already breathtaking equation and came up with $e^{i\pi} = -1$. I nearly fell out of my seat. It was a complete surprise. My astonishment at the result was exceeded only by my amazement at its beauty.

The equation brought together in one place the abstract concepts of negative numbers (numbers less than zero), imaginary numbers (the square roots of negative numbers), and transcendental numbers (numbers that, with minor qualifiers, are not solutions of algebraic equations; π and e are the two best known transcendental numbers).

That equation confirmed for me (in my sixteen-year-old wisdom) the reason that mathematics was superior to science: $e^{i\pi} = -1$ was true then, would always be true in the future even after humans had disappeared, and had been true before the first human ever existed. Science is messy—new observations can overturn the firmest beliefs—but the pure logic of mathematics revealed eternal truths, including beautiful ones such as $e^{i\pi} = -1$, that could never be contradicted.

The way I see the world now is rather different. While the logical perfection of mathematics remains, its very perfection is what detaches it from the messiness of reality. Hence, to a scientist, mathematics is reduced to a tool—something to be used in pursuit of the real goal, understanding reality (as opposed to achieving logical perfection). It is this difference in perspective that suggests to me a possible reason that mathematicians are more likely to believe in a god than are scientists: mathematicians may be more open to the logical

possibility of a god, while scientists may give greater weight to the low empirical probability that a god exists.

Biologists

It turns out that biologists have the lowest rate of belief in a god. Most likely, in parallel to the ways the laws of physics and the age and size of the universe discourage belief in a god for physicists, it is evolution that fosters religious skepticism in biologists.

Some religions have adapted to modern biological science by accepting that evolution is at its core. However, they have argued that evolution is a means for fulfilling some divine purpose, such as putting humans at the top of the food chain (though they might not phrase it this way). There are several positive results that occur when a religion accepts science as a separate area of inquiry rather than treating it as an enemy. The acceptance neutralizes political opposition to scientific inquiry and allows the religion's members who wish to do so to become scientists without fear of being shunned.

Unfortunately, though, the central idea of evolution is that it is random—there is no purpose. Whatever life-forms exist now do so as a result of the innumerable quirks, disasters, and other environmental circumstances that occurred on planet Earth over the past four billion years. We and other species are accidents of history who happen to be around at this particular moment in time. To say, for example, that a god aimed a comet at the Yucatan peninsula 66 million years ago to kill off three-quarters of all animal and plant species, including the dinosaurs, so that we could evolve from tree shrews strains the credulity of biologists.

Psychologists

Depending on your point of view, psychologists' primary reason for religious skepticism, compared to those I've already mentioned, can be seen as either the most superficial or the most profound. From the points of view of physicists and biologists, psychologists have no comprehensive theories to match general relativity, quantum mechanics, or evolution. Nor do they have the scope of observations concerning the age and size of the universe, the world of subatomic particles, or the history of life on our planet. In this sense, psychologists' skepticism about the existence of a god is a superficial one.

On the other hand, if there is one implicit message that psychologists receive and transmit throughout their education and careers, it is that subjective experience, while a fascinating object of study, is not a reliable indicator of objective reality. Nineteenth century psychophysics experiments explored the lack of correspondence between physical stimuli and the sensations they evoke. For example, there is not a straight-line relationship between the weight of an object and how heavy it feels or the brightness of a light and how bright it appears. The study of several optical illusions also has a long history. Visual illusions, from figure-ground reversals to mirages, similarly show that an unchanging visual stimulus can lead us to see different things that vary from moment to moment, and also that we can both not see things that are there and see things that are not there. Furthermore, we have instruments that measure sights, sounds, and other stimuli that human sensory organs are inadequate to detect. In other words, our sensations and perceptions do not necessarily reflect objective reality. The entire field of abnormal psychology deals with unusual thoughts, feelings, and behavior, and much of psychiatry involves the use of drugs to change subjective experiences such as sadness or hallucinations.

In short, psychologists are inclined to view religious experiences as interesting subjective phenomena unrelated to the existence of a god or other supernatural phenomena. For example, out-of-body experiences—which are rare but well-documented phenomena—have been used as evidence for the existence of a soul. Believers contend that whatever entity it is that leaves the body during an out-of-body experience might be able to continue an existence after death. Early in this twenty-first century, however, it was discovered that out-of-body experiences result from a disturbance in functioning of the temporo-parietal junction in the brain. That is, they are subjective experiences, but there is no entity that actually leaves the body.

This is the sense in which psychologists' skepticism about a god is seen as profound. If the experience of a god or other religious phenomena is all there is—just transitory subjective experience, rather than evidence for the eternal existence of a god or an afterlife—then there is nothing substantive to believe in.

People can enjoy their religious experiences, including the experience of a god, if and when they have them—the way they enjoy a piece of music or a painting—without needing to believe that a god actually exists or to view their experience as a better indicator of reality than science. This enjoyment is similar to (if more intense than) the way we can appreciate a video depicting objects moving in ways inconsistent with gravity without seeing the video as challenging the laws of physics.

A Parable

On a religious note, I close with a parable, probably apocryphal, told about Albert Einstein.

> An acolyte asked the great physicist, "Tell us, Dr. Einstein, why is it that we try to understand psychology in terms of biology; we try to understand biology in terms of chemistry; we try to understand chemistry in terms of physics; and we can only understand physics in the language of mathematics?"
>
> "That," replied the sage, "is a question for a psychologist."

■

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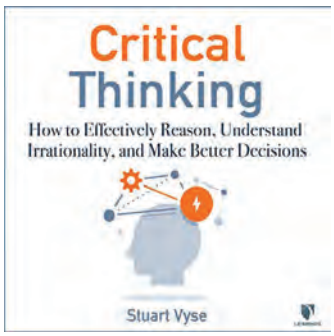
Recording a Skeptical Audio Course

STUART VYSE

The subject line of the email read "[So-and-so] said I should talk to you," but the so-and-so was not a name I recognized. Nonetheless, I opened the email and discovered it was an invitation to record an audio course. I had never done anything like that before, but I ultimately agreed to do it. I had spent almost thirty years teaching psychology to undergraduate students, and now that I was no longer teaching, it seemed like a good way to memorialize my work and make a course available for a general audience. I was to prepare fifteen twenty-minute lectures, and I would have to travel to a studio in Rockville, Maryland, to record the courses.



In designing the audio course, I drew material from two of my most popular courses. Irrational Behavior covered superstition and belief in the paranormal and made use of material from my book *Believing in Magic: The Psychology of Superstition*. I also included some material from a behavioral economics course that drew on my book *Going Broke: Why Americans (Still) Can't Hold on to Their Money*. Topics in the audio course include: logical fallacies and baloney detection, conspiracy theories, flat-earth belief and other odd beliefs, heuristics and biases, irrational consumer choice, magical thinking in children and adults, and the origins of common superstitions (e.g., the evil eye, the number thirteen, and astrology).

Despite having taught all the material many times before, preparing the audio course was a challenge. Unlike classes I'd taught, I couldn't assign readings or use a chalkboard or project slides. Because there were no live students, I couldn't engage in conversation with my audience. Most important, without any feedback, I couldn't tell whether my jokes were working. At the same time, I needed to keep the course interesting without the help of many of my usual teaching methods. There were a few benefits of the format. The lectures were only twenty minutes long, which is a reasonable length of time for your average commuter, and I had the opportunity to pick what I thought were the best and most entertaining bits of my courses.

The recording process was somewhat harrowing. The production company put me up in a motel near their recording studio, and I was scheduled to record for two days—eight lectures per day. The course was videotaped in case the company wanted to release it as a video course, which meant I had to lecture in a jacket and tie—something I never did. The recording studio was decked out with a very learned-looking backdrop, complete with leather-bound books and a window looking out onto an ivy-covered college campus scene. I stood behind a large wooden lectern and read my notes off my laptop. Although I had practiced my lectures several times at home, one of the problems was hitting the twenty-minute mark. In a regular college class, it is always possible to stop when the time is up and finish up at the next meeting, but for the recorded lectures, I had to wrap up the topic in as close to twenty minutes as possible. Lecturing was very familiar and easy, but in this case, I had to keep my eye on the clock and the amount of material remaining. It was a bit challenging at first, but it got easier as time passed.

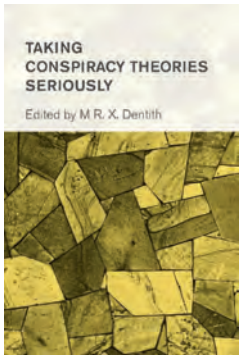
I managed to complete all fifteen lectures, eight lectures per day—four before lunch and four after. I muffed the timing of the first lecture—finishing several minutes early—so I had to rerecord it at the end of the second day. I was tired after the recording sessions were over, but it was quite gratifying when the course was released a few months later.

For now, "Critical Thinking: How to Effectively Reason, Understand Irrationality, and Make Better Decisions" is available exclusively on Audible.com, which you can also access through Amazon.com, but eventually it will be available elsewhere. Creating an audio course was a more difficult process than I expected, and I am not sure I would do it again knowing what I know now. Nonetheless, I am very happy the course is out there. ■

Stuart Vyse is a retired psychology professor and a SKEPTICAL INQUIRER columnist and contributing editor.

Who's Afraid of Conspiracy Theory *Theory*?

Stefano Bigliardi



Taking Conspiracy Theories Seriously. By Matthew R.X. Dentith, Rowman & Littlefield International, 2018. ISBN: 9781786608284. 251 pp. Softcover, $34.95.

On June 6, 2016, the newspaper *Le Monde* published a collective opinion piece criticizing the French government for not being effective in combating "conspiracy theories." The piece conveyed the impression that *any* narrative touching upon a conspiracy qualified as fallacious disinformation (Bronner et al. 2016). Against such an attitude, Matthew R.X. Dentith prescribes rigorous logico-epistemological scrutiny: in its light, conspiracy theories turn out to be not so irrational after all, and we discover that the very reference to "conspiracy theories" as a monolithic subset of narratives is misleading. This, in a few words, is the spirit that breathes through the pages of *Taking Conspiracy Theories Seriously*, a collection of essays on conspiracy theory *theory* (i.e., the theory of conspiracy theory) written by the editor and eight other contributors from the fields of philosophy, psychology, and sociology.

We discover that the very reference to "conspiracy theories" as a monolithic subset of narratives is misleading.

The first section, with essays by Dentith along with Patrick Stokes and Lee Basham, offers fine-grained discussions of *generalism* vs. *particularism*, i.e., the idea that conspiracy theories are a (fallacious) *class* of theories vs. the idea that each narrative should be judged on its own merits. The second section, consisting of essays by Ginna Husting, Kurtis Hagen, Martin Orr, Marius Hans Raab, David Coady, Charles Pidgen, as well as by the contributors to the first section, is a series of reactions to the aforementioned *Le Monde* piece (whose authors declined the offer to contribute to the volume; see p. xi).

This is a book that anyone with an interest in understanding conspiracy theories should study attentively. I especially recommend it to researchers and university instructors who may be deeply immersed in the study of a *specific* conspiracy theory (or a cluster thereof, for they seem to come in intertwined batches); reading Dentith's volume is an effective way to gain perspective. I find it also healthy and honest that the editor leaves equal room for contrasting viewpoints and that the discussion, besides *logic* and *epistemology*, frequently touches upon the *ethical* concerns in dealing with conspiracy theories: some authors point out, for instance, that certain conspiracy theories should not be given visibility (e.g., "Jewish conspiracy") while other authors observe that the "blanket dismissal" of any claim about conspiracies may dangerously blind people to actual conspiracies and turn into an anti-democratic practice.

Prospective readers without a solid background in philosophy should be warned, however, that most philosophical essays in this volume require an effort at following subtle reasoning; their authors resort to philosophical jargon that may read as opaque and repetitive. (Personally, after a youthful fling with analytical philosophy, I am no longer a fan of such language. I understand that some expressions can hardly be replaced in terms of succinctness, and I recognize the function of these expressions as identity-markers, but I cannot help feeling dizzy after being exposed, for instance, to repeated occurrences of *prima facie*—and without italics! An example of how far jargon is pushed: Touching upon Hannah Arendt, one contributor writes on page 119, "Her conceptualisation of agonistic political action is not inhospitable to Foucauldian inflections"; I am confident there are easier ways to express the same idea). On a similarly stylistic note, I can remark that this collection contains a fair deal of repetition

and overlap among the essays, so one may end up wondering whether the editor and the authors could have done a better job at polishing and amalgamating the contributions.

Finally, let me offer a brief and modest reflection about conspiracy theory *theory*. I do regard Dentith's volume as a completely warranted and healthy offset to the appeal on behalf of the *Le Monde* authors, which seems to have been hasty and sloppily formulated at best or obscurantist and cynical at worst (one may well wonder which behavior is worse for a scholar and a public intellectual!). More generally, I regard this collection as a useful "Socratic warning" for all those who may feel the temptation, or run the risk, to pejoratively and prematurely label a narrative as "conspiracist" and dismiss it as such. That being said, there is perhaps a third phenomenon in between superficial pathologizing or dismissal of conspiracy theories and fine-grained, *abstract* analytical understanding of conspiracy theories as represented in this collection. I am referring to the use of *conspiracy theory* by authors of general-public articles who crystallize and express in accessible form the results of scholarly investigation into specific conspiracy narratives that ended up being debunked. I am one of them (at least, I try to be).

Although I have admittedly fallen for at least one of the conspiracy theory theories proven wrong in this collection, I feel compelled to add that, while writing for the general public, scrupulous authors (or authors striving for scrupulousness, at least) hardly use *conspiracy theory* as a dismissive and derogatory label while trying to induce their readers into generalized dismissals. To be sure, *conspiracy theory* is, together with *conspiracism* or *conspiracist culture* (and their equivalents in other languages), an immediately recognizable expression among "skeptical" readers. It *is* used as a general label, and it *does* carry negative undertones, yet in such literature it is used as a short form for "a narrative that has already been proven wrong on various counts by skeptic writers or investigators, with the reasons why it is wrong explained in fairly good detail for the general public." In other words, *conspiracy theory* is, more often than not, a short form for "debunked narrative whose debunking has been performed after adopting a case-by-case approach using tools provided by different experts."

In this sense, the problems of conspiracy theory pathologization and of generalism, while remaining serious, may be *slightly* less serious than one may judge at first sight. The "communities of inquiry" of diverse experts across disciplines taking conspiracy theories seriously that Dentith discusses in the book's final essay may already be more of a reality than the essay suggests. ■

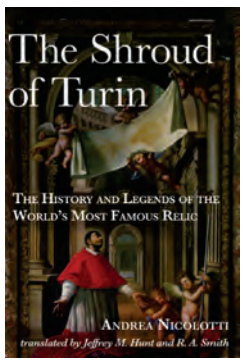
Reference

Bronner, Gérald, Véronique Campion-Vincent, Sylvain Delouvée, et al. 2016. *Luttons efficacement contre les théories du complot*. *Le Monde* (June 6): 29.

Stefano Bigliardi is an assistant professor of philosophy at Al Akhawayn University in Ifrane, Morocco.

The Shroud of Turin in History and Myth

JAN WILLEM NIENHUYS


The Shroud of Turin
The History and Legends of the World's Most Famous Relic
Andrea Nicolotti
translated by Jeffrey M. Hunt and R. A. Smith

The Shroud of Turin: The History and Legends of the World's Most Famous Relic. By Andrea Nicolotti. Waco, Texas: Baylor University Press, 2020. 523 pp. Hardcover, $59.95.

The remarkable thing about the Shroud of Turin is that it started out as merely a painting but ended up being treated as a relic—namely a piece of cloth bearing an imprint of Jesus's dead body.

Church historian Andrea Nicolotti's tome on the history of the Shroud is a magnificent book with a wealth of interesting and thoroughly researched details. The original Italian edition was quite rightfully awarded two prizes and is recommended by colleague historians. It's not Nicolotti's first publication on the subject. In the past ten years, he has published about two dozen scholarly articles and books on the Shroud.

The Shroud, a piece of linen of about four by fifteen feet with a picture of a tortured man's front and back on it, first turned up shortly around 1355, when it was immediately recognized as a lu-

crative fraud. In 1389 it resurfaced, and bishop Pierre d'Arcis complained about the fraud to the pope, referencing the investigations of his predecessor. That's the very first historical mention of the Shroud: as a fake. Nicolotti tells the history in great detail and explains that there were at least forty shroud relics in those centuries.

That's the very first historical mention of the Shroud: as a fake.

There is a lot of correspondence in the first century of the Shroud's existence, altogether about fifty documents. Ownership of the Shroud and the right to exhibit it were fiercely contested. Remarkably, none of the parties concerned ever claimed that it was a genuine relic. In 1453 Louis, Duke of Savoy, acquired the shroud (although *fenced* would be a better word).

The origins were quickly forgotten, and the House of Savoy enjoyed being the possessor of a powerful relic. From 1578 onward, the Shroud was kept in Turin, the seat of the House of Savoy. In that time, it was frequently exhibited for large crowds. It was also copied, and the copies were themselves copied, and so on.

Then in 1898, the Shroud was photographed during a large exhibition. The photographer noticed that the negative looked very lifelike. The miracles of modern technique eliminated all doubts about the authenticity. This was reason for Canon Ulysse Chevalier, a very accomplished historian and truly Nicolotti's hero, to investigate the matter. He found the fifty documents mentioned above and concluded that the Shroud was just a medieval painting. Many Shroud fans were very angry. Just when a secret papal committee concluded that Chevalier was right, his superiors forbade him to publish anything more on the subject. Others came to the same conclusion, but such results were kept secret, and it seems clear why: exhibitions of the Shroud are very lucrative.

Not only do the documents prove its medieval origin, but the cloth itself is a herringbone weave with Z-twist yarn. This points to a medieval origin in Western Europe. This is already mentioned in a book by Ian Wilson on the topic, but Nicolotti has meticulously established that the testimony of the textile is quite strong. The Shroud has been examined physically in great detail (Walter McCrone's book *Judgment Day for the Turin Shroud* is excellent), but Nicolotti pays most attention to the radiocarbon tests of 1988. They were conducted by three distinguished radiocarbon dating scientific laboratories in Tucson, Oxford, and Zurich. The first meeting about this test was in 1986. The participants could not agree on anything, and the typewritten verbatim record of the meeting ran to 700 pages! Finally, the test results were published in *Nature*, the world's leading multidisciplinary scientific journal (vol. 337, 611–715, February 6, 1989), concluding that the period 1260–1390 CE had a 95 percent chance that it contained the Shroud date. Just as expected.

The believers didn't accept this, offering various rationalizations such as the pollution theory. The Shroud was a bit damaged in a fire of 1532. But if pollution in 1532 with then-modern carbon takes off 88 percent of its age (as claimed), then the pollution must be about 88 percent of the mass of the total, which is impossible. Moreover,

Chevalier concluded that the Shroud was just a medieval painting. Many Shroud fans were very angry.

labs that do C14 dating routinely clean the samples very thoroughly.

Another "explanation" is that scientists are all atheists, hence liars. Several outrageous theories postulate nuclear reactions that accompanied the Resurrection. Both the image and the carbon rejuvenation are taken care of in one fell swoop. Remarkably, one French researcher managed (in 2017) to deduce from a piece of sticky tape of 0.001 square inches that had been in contact with the Shroud that Jesus had red hair and used a copper razor. Nicolotti has many more such interesting details as well about all the fanciful pre-1355 histories that have been concocted over the years.

Several outrageous theories postulate nuclear reactions that accompanied the Resurrection.

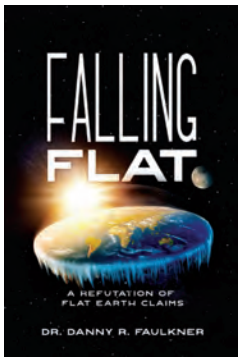
Meanwhile, information about the Shroud is kept secret, and real investigators are kept at bay. The believers, or "shroudies," organized in quite a few national societies, keep writing books and articles and holding conferences. They call themselves "sindonologists" (*sindon* is Greek for *linen*, cf. Matthew 27:59); it's an expanding cult.

Apparently ecclesiastical authorities don't feel that all this Shroud pseudoscience is actually an insult to a painting that in all its clumsiness might be just as inspirational as the Adoration of the Mystic Lamb in Ghent, which dates back to the same time—but which was made by a much better artist. ■

Jan Willem Nienhuys is a mathematician, formerly at Eindhoven University of Technology, and secretary of the board of the Dutch skeptics group Skepsis. He is a fellow of the Committee for Skeptical Inquiry.

Flat-Earthery Will Get You Nowhere

Glenn Branch



Falling Flat: A Refutation of Flat-Earth Claims. By Danny R. Faulkner. Master Books, Green Forest, Arkansas, 2019. ISBN 978-1-68344-206-6. 385 pp. Softcover, $16.99.

A fifth of the way into the twenty-first century, it is hard to believe that flat-earthers are still around. Faced with assertions of flat-earth belief by figures from the athletic and entertainment worlds, it might be tempting to dismiss them as insincere or aimed at getting attention. Yet there are credible polls indicating that the level of acceptance of flat-earthery is about 1 percent in the United States, Britain, and the Netherlands—and possibly even higher in France and Brazil. And the phenomenon of flat-earth conferences suggests a degree of sincerity: someone who spends $1,000 to attend such a conference presumably is not doing so ironically or frivolously.

Danny R. Faulkner's announced ambition in *Falling Flat* is "to provide answers for people who, when confronted with arguments that the earth is flat, may not know how to respond" (8). Accordingly, a good portion of the book—seven of its thirteen chapters—reviews the abundant scientific evidence against the idea that the earth is flat. (Indeed, the running head throughout the book erroneously renders its subtitle as "A Scientific Refutation of Flat Earth Claims.") Reasonably enough, Faulkner concentrates on what might be called "mainstream flat-earthery," according to which the earth is a finite flat disk, to the exclusion of the more *recherché* variants.

In these chapters, Faulkner, who earned his PhD in astronomy from Indiana University and taught for a quarter of a century at the University of South Carolina's satellite campus in Lancaster, offers a competent review of the science, discussing observations of the curvature of Earth and the evidence afforded by eclipses, the positions of astronomical bodies in the sky, observational astronomy, and Newtonian physics. The mathematics involved is generally trigonometry at the high school level, with a smattering of differential calculus. Though a little dry overall, the treatment is enlivened by Faulkner's relating his face-to-face encounters with flat-earthers and his do-it-yourself experiments.

Falling Flat is weaker on history, however. Relying on Jeffrey Burton Russell's *Inventing the Flat Earth* (1991), Faulkner emphasizes the fact that the ancient Greeks accepted the sphericality of Earth by the time of Aristotle and that—contrary to a myth promulgated in the nineteenth century—most scholars in Europe never lost sight of that through the Middle Ages and into the Renaissance. But he never cites the leading history of the flat-earth movement itself—Christine Garwood's invaluable *Flat Earth* (2007)—and, as he recently acknowledged, he did not even bother to read it until after the publication of his own book.

Particularly egregious is Faulkner's treatment of the polymath William Whewell, accused of perpetrating the idea—indeed, "the lie"—that the church fathers and the medieval church generally thought that the earth was flat (36, 39). True, in his *History of the Inductive Sciences* (1837), Whewell noted the existence of three obscure Christian scholars—Lactantius, Cosmas Indicopleustes, and Tostado—who allegedly were flat-earthers. (He was not the first to cite these particular scholars; James Bell did so in print in 1829.) But Whewell also emphasized that "all astronomers" after the ancient Greeks adopted "the doctrine of the globular form of the earth." Did Faulkner actually read Whewell's book?

Worse, Faulkner peddles a conspiracy theory about the flat-earth movement, suggesting that in both its Victorian and modern incarnations, the aim was to discredit the Bible and Christianity. In so doing, he neglects the fact that for a century and a half, the leading figures of flat-earthery not only identified themselves as Bible-believing Christians but also cited verses from the Bible in the service of their flat-earth belief. The seminal Victorian flat-earther Parallax insisted, "To say that the Scriptures were not intended to teach science truthfully, is in substance to declare that God himself has stated, and commissioned His prophets to teach things which are utterly false."

Why is Faulkner unwilling to credit the sincere biblical underpinnings of flat-earthery? Because he shares the underlying view that the Bible is without error in what it teaches, even about

matters of science. Faulkner is in fact a young-earth creationist, who currently serves as editor-in-chief of *Creation Research Society Quarterly* (published by a society that insists "the account of origins in Genesis is a factual presentation of simple historical truths") and works for the creationist ministry Answers in Genesis (which includes a similar characterization of Genesis in its statement of faith). Flat-earthers such as Parallax threaten to present a *reductio ad absurdum* of biblical inerrantism.

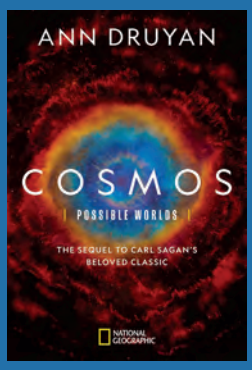
Thus three chapters of *Falling Flat* are devoted to contending that the various texts commonly adduced in evidence of the Bible's commitment to a flat earth are figurative, misinterpreted, inconclusive, or (in the case of those from the apocryphal book of Enoch) not in the Bible at all. Here Faulkner is no longer in his area of competence (although, in light of the creationist tendency to reject mainstream biblical scholarship, he would presumably not be impressed by the criticism). And his conclusion—"*Clearly, the Bible does not teach that the earth is flat*" (337, emphasis in original)—is obviously foreordained. These chapters are not likely to be of general interest.

Today's flat-earthers, while relying on the arguments of their Victorian predecessors, are not so clearly committed to the inerrancy of the Bible. Instead, as Faulkner observes, they appear to have succumbed to a proclivity to conspiracism, abetted and intensified by the internet. But the diminished emphasis on the inerrancy of the Bible among flat-earthers ought to be of no comfort to Faulkner, because biblical inerrantism is on the decline anyway. In a Gallup poll conducted in 2017, fewer than one in four Americans agreed that "the Bible is the actual word of God, and is to be taken literally, word for word" comes closest to describing their views about the Bible: a record low. ■

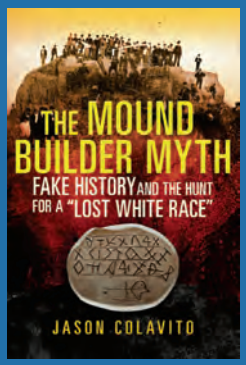
Glenn Branch is deputy director of the National Center for Science Education. He is engaged in ongoing research with Craig A. Foster on the contemporary flat-earth movement.

NEW AND NOTABLE]

Listing does not preclude future review.



COSMOS: Possible Worlds. Ann Druyan. The sequel to Carl Sagan's classic, this is also the companion book to the thirteen-part 2020 season of the television series of the same name. Yet it is a stand-alone book in Druyan's own insightful and poetic voice, allowing her to expand on the personal stories of too-little-known historical figures in science who shaped our understanding of the world. It is also about how hard (yet productive) true scientific thinking can be. Druyan, who collaborated with Sagan on the first *Cosmos* series, shares his visual and inspiring powers of description, sense of awe, and innate blend of wonder and skepticism. "Science, like love, is a means to … transcendence, to that soaring experience of oneness in feeling fully alive," she writes. "Through these stories I have come to feel more intensely the romance of science and the wonder of being alive right now." Beautifully illustrated with color artwork and photos. National Geographic, 2020, 383 pp., $30.00.



THE MOUND BUILDER MYTH: Fake History and the Hunt for a 'Lost White Race.' Jason Colavito. Colavito, a blogger and author of several books, including *The Cult of Alien Gods: H.P. Lovecraft and Extraterrestrial Pop Culture*, examines how Native American burial mounds across the United States have been systematically recast as having been built by a lost white race of "true" native Americans. Through impressive historical scholarship (documented in extensive endnotes and references), Colavito describes the ample evidence (gathered by Thomas Jefferson, among others) that the mounds were built by Native Americans but later co-opted by others with a racist agenda. He connects archaeological frauds such as the Cardiff Giant and works by H.P. Lovecraft to more recent religious and white supremacist efforts to fabricate and perpetuate a false history and pseudo-archaeology that robs Native Americans of their heritage. University of Oklahoma Press, 2020, 402 pp., $24.95.

STRANGE BUT TRUE: 10 of the World's Greatest Mysteries Explained. Kathryn Hulick; illustrations by Gordy Wright. A delightful skeptical romp through classic mysteries, including UFOs, haunted houses, the Bermuda Triangle, monsters, King Tut's curse, Atlantis, zombies, and more. After mentioning Occam's razor, Hulick asks readers, as they're "reading about each mystery, check the sources. Interrogate the evidence. Watch out for coincidences. And remember that simple explanations are more likely to be true." One valuable aspect of *Strange but True* is that Hulick updates and brings a fresh perspective on staid topics. For example, the section on the Bermuda Triangle begins not with the usual rehashed breathless claims of lost ships from the last century but instead with the 2014 disappearance of Malaysia Flight 370 over the South China Sea. She circles back for a skeptical look at the practical reasons it's so difficult to locate a plane in a vast ocean even in modern times. Mystery-mongers often exaggerate (or fabricate) mysteries by stripping out context, and Hulick does a fine job of putting them in perspective and thus making them comprehensible. It's not easy to distill many of the claims (and their skeptical responses) into short sections, but Hulick deftly does so, aided by endnotes for further reading. The world needs more books like this, encouraging skepticism and critical thinking using inherently interesting mysteries. Francis Lincoln Children's Books, 2019, 127 pp., $22.99.

—Benjamin Radford and Kendrick Frazier

Alternative Medicine: Placebos for Pets

Harriet Hall

Placebos for Pets? The Truth about Alternative Medicine in Animals. By Brennen McKenzie, VMD, MSc. Ockham Publishing, 2019, ISBN: 978-1-9212701-36-0. 481 pp., Softcover, $17.99.

Alternative medicine is accepted by many humans, but we may forget that it is also imposed on their pets. Veterinarian Brennen McKenzie has done cats and dogs everywhere a great service by compiling "The Truth About Alternative Medicine in Animals" and publishing it under the title *Placebos for Pets? The Truth about Alternative Medicine in Animals*.

Animal and human medicine are the same yet different. They both rely on scientific evidence, build on the same basic science, study the same subjects—such as anatomy and physiology—and have much more in common. But humans are not rats (even though some people have been known to call others rats—usually with the addition of the word *dirty*). And all animals are not the same. What cures an elephant might kill a bunny. Aspirin causes congenital defects in mice, but not in humans. Horses don't have gallbladders. It is not valid to extrapolate findings from studies in one species to another species.

Human and veterinary science are interdependent. Animal studies frequently precede human clinical studies; they can provide valuable information but not reliable clinical guidance. Veterinarians are forced to rely on human studies, because they are more plentiful, and few or no studies may have been done on the species they want to treat.

McKenzie has written for *Science-Based Medicine*, and he tries to do for animals what the SBM website tries to do for humans—not only does he provide science-based evaluations of treatments and claims, but he teaches readers the principles of science to help them learn to do their own critical evaluations of claims. McKenzie points out that veterinarians spend as much, if not more, time interacting with people as with animals. That reminds me of a pediatrician I once knew who said that good pediatrics consists of benign neglect of children and emotional support of parents. Dogs and cats can't read this book, but their owners can learn from it—if they are willing.

But some pet owners will refuse to learn. McKenzie relates an encounter with a client who was sure her dog's pain had almost completely gone away with homeopathy and acupuncture. When he pointed out that the dog couldn't bear weight on his leg and cried out when it was touched, the owner became angry. Another client believed an energy healer's diagnosis that her dog's cough was due to leukemia. All tests were negative, and the cough resolved with antibiotics. The client refused to believe that the healer could have been wrong. She was convinced that the healer had correctly diagnosed leukemia before it could show up on any tests, and then had cured it with homeopathy.

Beliefs such as these can directly harm animals.

McKenzie lays a strong foundation by explaining how only science can give us reliable answers and how complementary and alternative medicine (CAM) relies on anecdote, philosophy, and belief systems rather than on credible, reality-based scientific studies. He explains how pet owners are misled by metaphysical beliefs. Some CAM vets claim that we can influence the world by our thoughts and that we can cause disease in our pets with our thoughts and feelings. They say the physical aspects of illness are secondary—if they matter at all. They believe that to be effective, practitioners must create a healing state with their own energy fields. McKenzie rejects such nonsense; his methods are firmly grounded in reality.

McKenzie covers homeopathy, acupuncture, manual therapies such as chiropractic and massage, herbal medicine (the most promising but also the most potentially dangerous CAM), dietary supplements, and alternative nutrition. Then he devotes another chapter to various other CAM practices such as aromatherapy, colloidal silver, cold/low level laser therapy, cupping, and many others. One that was new to me but apparently enjoys widespread use in veterinary circles is Yunnan Baiyao. The research on this herbal remedy is mostly

McKenzie lays a strong foundation by explaining how only science can give us reliable answers.

negative, and it's not clear that it's safe.

McKenzie debunks a number of myths about nutrition, raw diets, GMOs, etc., and quips that while cats thrive on a diet of raw mice, he doesn't recommend it for readers of his book! He provides a handy visual aid to determine if your cat or dog is at, below, or above a healthy weight. The book is plentifully illustrated, and some of these I got a kick out of: a deluded chiropractor leaning on a horse's back in the belief that she is "adjusting" its spinal subluxations, a dog wearing multiple acupuncture needles in its butt, and a grumpy cat being subjected to cold laser therapy.

McKenzie provides a new slant on some old issues. He points out that a low-carb diet means a high-fat and/or high-protein diet. No one provides truly "holistic" medicine that addresses *everything* about a patient. So-called holistic vets only address the things they think are important. "Natural"? "There is virtually nothing in medicine that doesn't involve some effort or alteration of natural materials by humans." Naturopathy? It has little real substance. McKenzie also says the concept of detox "freely mixes bits of reality and science with unproven assumptions and outright myth to create a 'toxic' brew that can mislead us into irrational or inappropriate use of herbal medicines."

He asks the same three simple questions of any treatment, whether alternative or mainstream: What is it? Does it work? Is it safe?

He offers his eponymous McKenzie's Law: if it has no side effects, it isn't doing anything. He points out that a treatment that is claimed effective for many diverse conditions probably isn't really effective for any of them. He offers a "bottom line" conclusion for each remedy he covers. He says homeopathy is based on ideas that are not compatible with established scientific principles. Although he is trained in acupuncture and practices it, he calls it "mostly a placebo." (He offers it only after educating clients and getting truly informed consent; he knows placebos can make animals feel better but don't actually improve their health). His language is circumspect, nuanced, and generally polite, but he doesn't hesitate to call Reiki "complete nonsense." People say animals don't respond to placebos, but they don't need to. Their owners respond for them, and he explains in great detail how that can happen.

The discussion of the evidence for the pros and cons of neutering dogs and cats was thorough and enlightening. I knew horses don't have gallbladders, but now I understand the acupuncturists' (faulty) rationale for sticking needles into a horse's gallbladder meridian (it is not a physical entity but a metaphysical concept!). Despite their exclusively bamboo diet, giant pandas are carnivores. Dogs and cats don't need carbohydrates, but they can use them perfectly well as a source of calories. Eating grass is a normal behavior, not an attempt to self-medicate.

Photo Credit: Donna Danford

I highly recommend this book. It's well worth reading even if you don't have a pet. It is well written and easy to read, with clear explanations provided in a conversational tone. McKenzie is respectful of most questionable treatments and describes the positive research findings, although he does point out their failings. He provides exhaustive references, including all the classic skeptical articles and books as well as all the pertinent studies published in both the medical and veterinary literature. It's a useful compendium of information on alternative medicine for animals, and it teaches readers how to figure out for themselves whether they can believe a new health claim.

If pet psychics really had access to animal thoughts, they might tell you the dogs, cats, and other companion animals of the world are grateful and would like to thank the author. I once played a pet psychic in a role-playing exercise (it was great fun and easy to make stuff up. "Fluffy tells me she loves you, and sitting in your lap reminds her of her mother—and the more expensive brand of food tastes better—and she wants you to buy this book!"). Since I know animals can't read or speak for themselves, I will speak out for them: Thank you, Brennen McKenzie, for this book and for all your hard work and clear thinking! ■

This review was previously published on the *Science-Based Medicine* blog.

Harriet Hall, MD is a Skeptical Inquirer columnist and contributing editor and a fellow of the Committee for Skeptical Inquiry.

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The Flying Disc Problem of 1947

The New Climate War

Michael E. Mann is correct when he says that we cannot allow the profits of a few companies to destroy our planet and that the misinformation tactics of Exxon and other major oil firms are criminal (Commentary, "How to Win the New Climate War," March/April 2020). However, the hydrocarbon producers are not the major problem. Certainly, extracting the raw material, transportation, and refining of products does release greenhouse gases, as do other manufacturers. But they are not the major polluters. Gasoline, diesel, and jet fuel are perfectly innocuous materials. It's the consumers of these liquids who are the culprits. There are about 1.2 billion automotive vehicles on Earth, plus nearly 40,000 planes and large numbers of construction machines, almost all fueled by hydrocarbons. As long as they exist, someone will supply their fuel. We must somehow replace them with equipment that doesn't emit CO_2. Perhaps we should be blaming Ford, GM, Toyota, and Nissan, not Exxon and Shell.

Art Davison
Edmonton, Alberta
Canada

I applaud Michael Mann for his exhortation that we make systemic changes to how we run the planet and that we remain science-based on how we do it. In that spirit, however, I offer a couple of caveats about personal actions: First, avoiding flying is *not* the right thing unless you live in a corridor providing appropriate rail service. The airline industry is obsessed with reducing fuel burn; if General Motors pushed efficiency the way Boeing does, every car on the road would achieve 60 mpg. The problem lies with the kinds of air service we want, not *that* we fly. Second, eating vegan is fine, but the idea that we could save the planet by turning vegan is overly simplistic. As food technology advances, however, we will have better options. Finally, renewables by themselves cannot provide the ever increasing amounts of power we need. Most available evidence shows that a mix of 50/50 nuclear and renewables does the trick.

Ron Arye
Reno, Nevada

The struggle against the tobacco industry's misinformation was helped a lot by lawsuits. Is there enough clear evidence to start considering lawsuits against some of the industrial giants for damages as a result of climate change?

Don Martin
via email

After what I think is an insightful article by Matthew C. Nisbet in SI (January/February 2020) making the case that on climate change "we gamble with the future by dehumanizing our opponents," I had a strong, negative, visceral reaction to Michael Mann's commentary "How to Win the New Climate War." I am aware of the political manipulations, disinformation, and misinformation that Mann outlines and strongly agree that we need to inform people of this, but labeling those who promulgate this as "the enemy," dehumanizing them, will most likely drive readers into the polarized thinking that is a root of our problem. Mann may be influenced by the merciless attacks he has endured to think in terms of "the enemy," but I think it seriously erodes what he is trying to convey. I would like to have been able to give his article to people I am trying to educate on climate change, but I will not do so. I regret the article was not written as Nisbet suggests: "There can be no progress on climate change until we rebuild our civic capacity to discuss, debate, and disagree in ways that do not turn every aspect of climate politics into an identity-driven tribal war between good and evil."

Clinton Brooks
Media, Pennsylvania

Who's Happier?

Stuart Vyse states that there is a "substantial body of research showing that religious people are happier than nonreligious people ("Are Atheists Sadder but Wiser?," March/April 2020). The studies he cites indicate that the respondents' happiness is self-reported in answer to a direct question rather than objectively measured by more detailed psychological testing. It is worth considering that in major world religions such as Christianity and Islam, gratitude to a god is entwined in the belief systems and offering thanks to a god are integral parts of each faith's religious service. In other words, a failure to show gratitude might rise to the level of apostasy in a believer, thus manifesting a bias toward religious believers claiming a higher level of happiness than they may actually feel.

Dan Vance
Valley Center, California

Mr. Vyse's column suggesting the (not conclusively established) possibility shown in various studies that religiously active persons generally are happier than atheists/agnostics was surprising—not because of the results but because of a basic consideration apparently omitted by researchers.

He noted that the studies determined happiness based on self-evaluation by the participants.

Anyone who's lived in a theocracy or areas of *de facto* theocracy can attest there's overwhelming pressure from religious leadership for the faithful to find positivity and happiness in their lives. This appears especially true with cult/quasi-cult organizations.

There are cultural pressures everywhere in the United States to suppress sad feelings, but in those *de facto* theocratic cultures, there's massive pressure to find fault with oneself every time sad feelings emerge. Members of such cultures are often reluctant to admit unhappiness even to their most intimate partners, much less to academics conducting research.

Better indications of unhappiness among religiously inclined persons might be to determine numbers of anti-depressant prescriptions filled in areas with high religious affiliations—possibly combined with vital records searches of the same areas determining suicide frequencies.

Otherwise, depending on people to identify themselves as happy or unhappy is like trying to get people to identify themselves as sociopathic or non-sociopathic.

Rob Ethington
Spokane, Washington

Stuart Vyse replies:

Dan Vance points to the use of self-report measures in studies of happiness and religion and suggests that happiness could be more "objectively measured by more detailed psychological testing." Happiness, like other emotions, is a subjective state. Psychologists have done considerable research on the implications of various self-report measures for happiness, but so far science has not produced a happiness thermometer that might get at the true measure of happiness below the self-report. Similarly, opinion pollsters have found no better way to

measure people's attitudes and beliefs than to simply ask them. There are good and bad ways to pose the question, but ultimately, we must rely on what the person says.

Vance also suggests that members of religious communities are obligated to report that they are happy; however, the methodologies used in these studies offer some protection against this concern. For example, several studies of happiness and religion are based on large social science surveys, such as the National Opinion Research Center's General Social Survey in the United States or the European Social Survey. These annual surveys ask people their opinions on a wide variety of social and political issues. Each respondent also answers several demographic questions, such as their age, race, gender, and religious preference. Researchers in a variety of fields use this publicly available data for many different kinds of studies, and participants respond to the survey anonymously and without knowing in advance the kinds of investigations that might result from their participation. Thus, the obligation to present oneself as happy because you are a member of a particular religious community should be minimized.

Rob Ethington also points to the use of self-report measures and suggests that antidepressant use and suicide rates among religious and nonreligious people might be better alternative measures. I've not made a comprehensive review of that literature, but contrary to Ethington's speculations—and consistent with the finding of higher happiness among religious people—there are several published studies showing lower suicide rates and lower antidepressant use among the religious people in comparison to nonreligious people.

Science/Religion: War or Harmony?

In his well-structured and informative review article "No War between Science and Religion? Many Scientists Disagree" (March/April 2020), Howard Feldman insists that a war is going on despite the contentions to the contrary by the scholars he cites. To support his otherwise-refuted belief in the war, Feldman cites the obvious and numerous examples of anti-evolution creationism in the United States. Yes, indeed, the struggle over Darwinian evolution in the public schools is real. But what Feldman hides behind his smoke and mirrors is this simple fact: all soldiers in the war over evolution love science. No one, not even the most conservative evangelical Christian, is antiscience. Evangelicals and even fundamentalists strongly affirm mathematics, physics, chemistry, biology, medicine … you name it. They object to one and only one science: evolution. And some object to Darwin's version of evolution on scientific, not biblical, grounds.

Now, I personally believe that creationist objections to Darwinian evolution are flatly misguided and even wrong. But, that's beside the point. No creationist (or anybody else for that matter) is at war against science on religious grounds. So, I ask, why does Feldman wish to fire up embers that have already gone out?

Ted Peters
Pastor, Cross and Crown Lutheran Church and School
Rohnert Park, California

Howard Feldman replies:

Thank you for your thoughtful response to my review. Your statement that creationists love science has been repeated many times by people such as Kent Hovind, Creation Magazine Live (a YouTube channel), and others, as I describe in the review. However, the love stops at evidence that contradicts their strict biblical chronology, and this is the point. It is not just evolution but also plate tectonics and cosmology, all of which forms the core of just about everything in science. Just where do the creationists think the very elements that make up chemistry come from? In my own field of petroleum geology, unraveling the long and complicated history of the earth is a significant part of modern petroleum exploration. So, it is not just an academic exercise; it has real-world economic implications.

My point is that the modern conflict is far more profound than described in the book or in your letter. Creationists love science but deny the succession of fossils that indicates evolution happened (Darwinian or not). They love science but deny the cosmological origin of the microwave background radiation (despite it being predicted to exist decades before it was discovered) without offering any physics-based alternative to its origin. They love science but deny the observations from modern stratigraphy and sedimentology that are wholly inconsistent with a flood origin.

I am glad that you have found harmony between religion and science and accept evolution and, I assume, all that goes with it. However, the embers of conflict have not gone out; they are burning brightly in certain communities.

Origin of Religion

Regarding David Ziegler's article "Religious Beliefs from Dreams" (January/February 2020), I have another take on the origin of religion that I wrote about in my book in 2015.

Homo sapiens went nearly extinct some time between 195,000 and 123,000 years ago. Because today's humans show a very low genetic diversity, it is most likely that every human alive can be traced back to a small group of survivors of that period (per Dr. Curtis Marean of Arizona State University).

I propose that this group regarded the air, the great spirit, as a life force, because it gave life to a baby with its first breath and departed at death when the last breath rejoined the Great Spirit, a universal belief that spread throughout the world. The breath (spirit) is considered a life force in old Scandinavian religions, in China *chi* or *qi*, in India *prana*, in Tibet *tranta*, in Abrahamic religion *spirit* or *soul*. Even in Mayan religion one of their various "souls" is breath.

Using Occam's razor, I propose that this original belief could be the "belief" that echoes throughout many, even very different, religions and might have been a common source of the current religions. I also suspect that dreams might have played an important part when religions developed independently from each other.

Benjamin Vande Weerdhof Andrews
Barrie, Ontario
Canada

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

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Tapestry of Blazing Starbirth:
Hubble's Thirtieth Anniversary Image

To commemorate three decades of scientific discoveries by the Hubble Space Telescope, NASA and the European Space Agency issued this image on April 24, 2020, of one of the most turbulent stellar nurseries the telescope has observed during its thirty-year lifetime. It is one of the most photogenic images of stellar nurseries the telescope has taken. The portrait features the giant nebula NGC 2014 and its neighbor NGC 2020, which together form part of a vast star-forming region in the Large Magellanic Cloud, a satellite galaxy of the Milky Way, approximately 163,000 light-years away. The image is nicknamed the "Cosmic Reef" because it resembles an undersea world. The Hubble Space Telescope was launched aboard the space shuttle *Discovery* April 24, 1990. Over the ensuing three decades, its images and breakthroughs have redefined our view of the universe.

Image Credit: NASA, ESA, and STScI